THE AEROPLANE and ASTRONAUTICS

MAY 6, 1960

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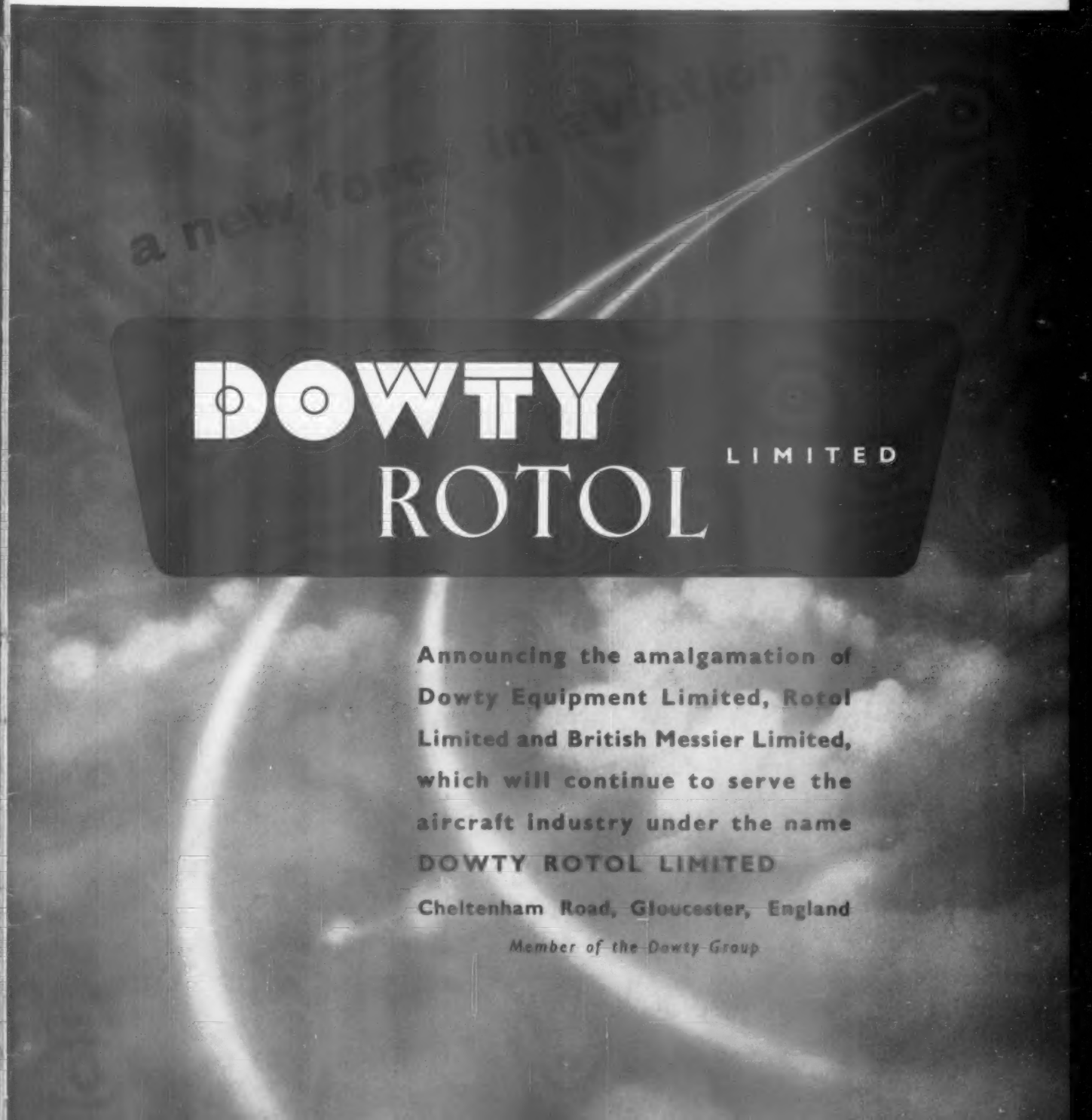

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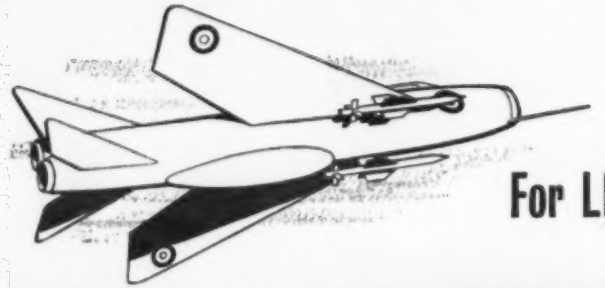

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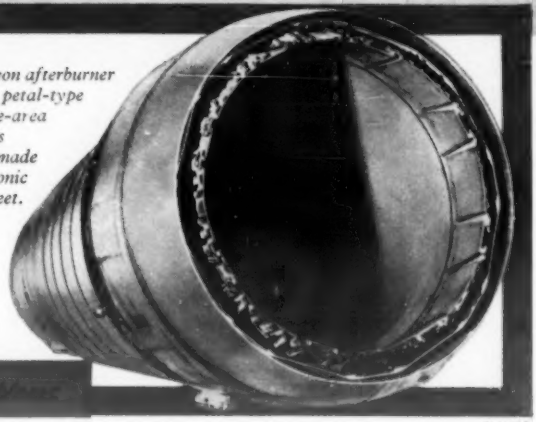

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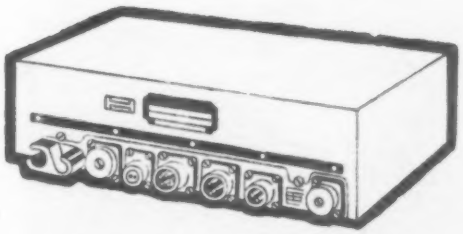

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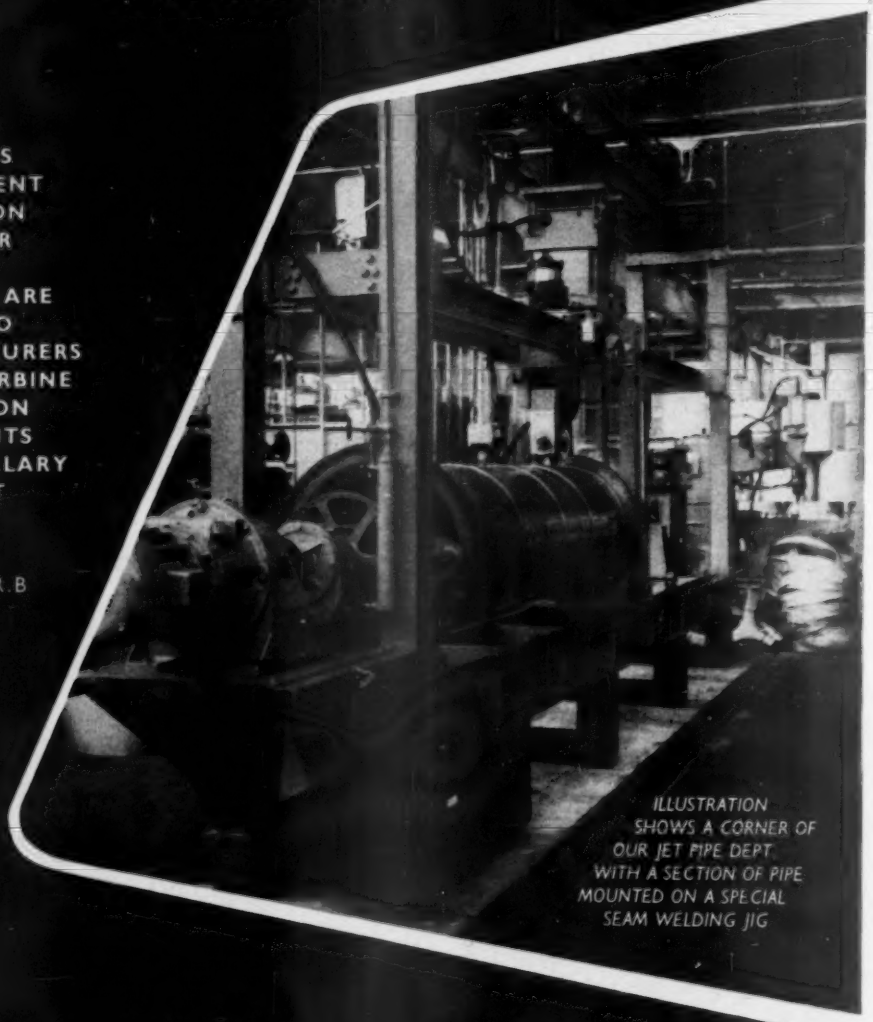

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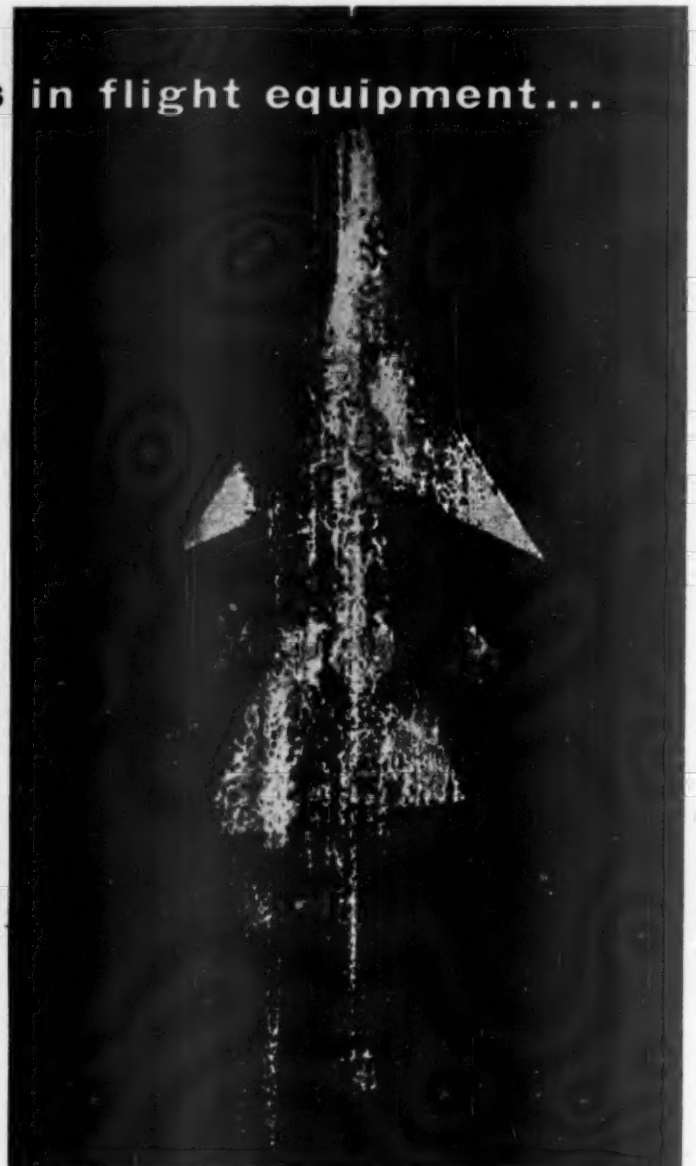

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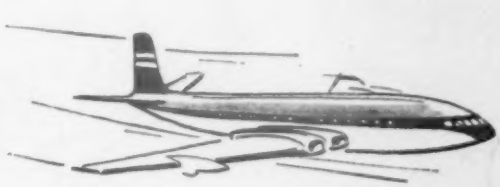

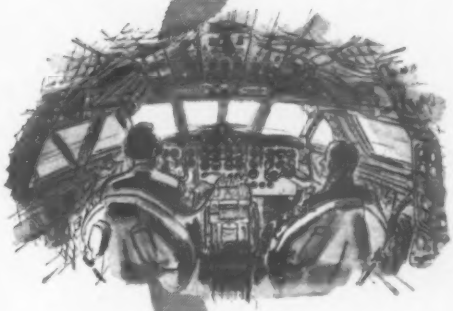

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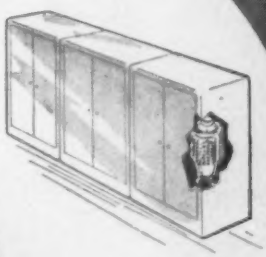

Computer and memory drum - calculations and conflict search

Flight planning

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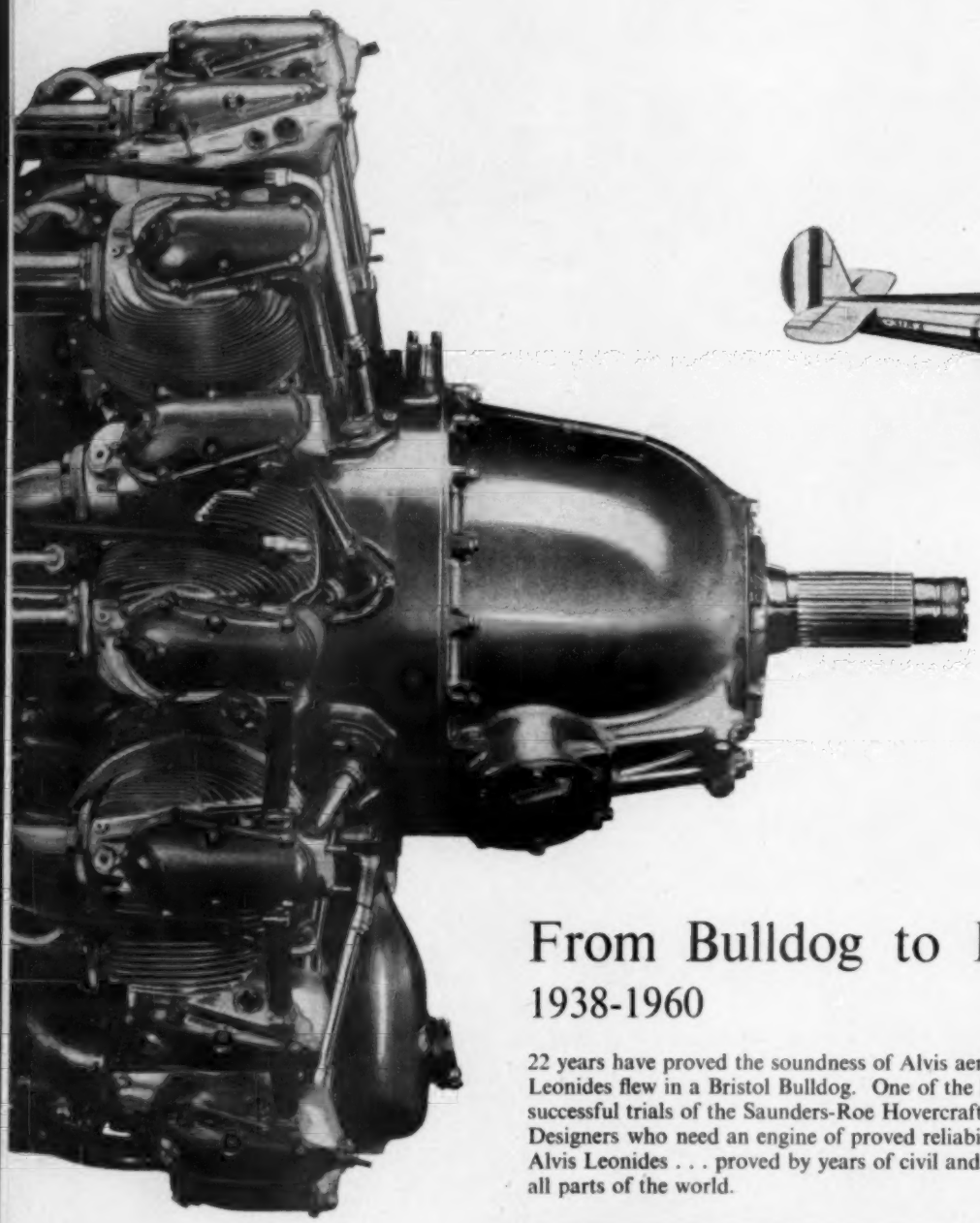

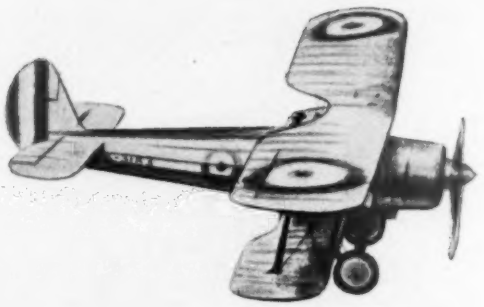

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1938-1960

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THE AEROPLANE and ASTRONAUTICS

VOLUME 98 NUMBER 2533 MAY 6, 1960

Out of the Red?

Let us hope that the cheerful news of B.O.A.C.'s improved results for 1959-60 marks a turning point in the Corporation's depressing recent financial history. Although B.O.A.C.'s own clear surplus for the financial year is likely to be no more than £100,000, and the associated companies incurred a deficit of more than £1 million, the fact that an operating profit of more than £4 million was returned—the highest yet—is the essentially important feature of the news.

No doubt the better results have been markedly helped by the effects of the campaign to reduce engineering costs. During 1960 the total operating costs should be down to 29d. a ton-mile (10d. lower than the figure of three years ago) and nearly half this improvement will have been contributed by the Engineering and Maintenance Department, which, as B.O.A.C.'s managing director said a fortnight ago, has brought its costs down from 10½d. to 5¾d. a ton-mile. But sales have also been vigorously pressed so that traffic has matched the 29% increase in capacity offered in 1959-60.

Commenting on the results, the Corporation's chairman described the payment of interest (amounting to £4 million) as "our guaranteed dividend." This is a quietly critical reference to the fact that the capital of B.O.A.C. (and of B.E.A.) is from fixed-interest-bearing stock. The Corporation has, therefore, to pay a fixed "dividend" regardless of its financial results.

In its report last February ("Wings Over Westminster") the Bow Group pointed out that during the past eight years B.O.A.C. and Pan American Airways have distributed almost exactly the same amount in interest and dividends respectively—yet P.A.A. earned twice the Corporation's revenue. The pros and cons of equity versus fixed-interest capital can be argued indefinitely—and it is doubtful whether the public would yet be ready to buy shares in B.O.A.C. even if such were to be offered. But, if such a method of capital-raising were to be both approved and successful, it would at least provide a useful public spur to the Corporation's efforts.

Saving Precious Seconds

One of the most critical factors in saving life following an aircraft crash on, or near, an aerodrome, is the time taken to get men and equipment to the scene. Often, if the crash is just outside the aerodrome boundary, there is some difficulty and delay in getting an ambulance to the spot. Frequently there is the problem of transporting extinguishers and apparatus across rough ground before any attempt can be made to extricate the unfortunate occupants.

As we report elsewhere in this issue, a stimulating proposal has recently been put forward to indicate the way in which a helicopter can, in a large number of cases, be employed to obviate such potentially fatal delays. The helicopter can be used as a rapid transport, and it can be made to serve a most useful fire-fighting purpose.

Here, perhaps, is a good opportunity for the development of a crude "open frame" cheap helicopter—a special version of the Whirlwind comes to mind as a possibility. And if this is considered to be too costly to leave lying around doing nothing, it should not be beyond the imagination to devise some secondary task such as "crane" duties for the inevitable building operations that seemingly are in constant progress around major airports. Even fire engines are sometimes used for pumping water out of flooded basements.

Editor - - - - - THURSTAN JAMES
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Matters of Moment

The Western Deterrent

THERE is now circulating in Washington a document which sets out the attitude of the United States Defense Department. According to *Aviation Week* it is being circulated to approximately 600 leaders of American public opinion. The figures given make particularly interesting reading following the Blue Streak debate.

The official statement justifies the heavy reliance on manned bombers at the present time. The argument runs that this makes a good deal more sense for the United States than does reliance on the intercontinental ballistic missile, whatever the situation may be for the Russians with their different resources, different geographical situation, different objectives and different problems.

Defences against the manned bomber have improved and may improve further. But so has the ability of the manned bomber to confuse and evade defences. More important, the B-52 is being equipped with the Hound Dog missile which will enable the bomber to stand several hundred miles off its target and fire ahead of it missiles many times as powerful as the first atomic bomb. When these have disorganized the defences, the bomber can come in with considerably more impunity and perform its precise mission—still carrying a payload several times greater than that of the Atlas missile.

At the same time the Defense planners admit that the intercontinental ballistic missile is a spectacular weapon and an extremely important one. But a nuclear weapon is equally lethal whether it is delivered by a ballistic missile or a bomber; and for the Americans—at present and in the immediate future—the bomber, in their view, is a far better delivery method.

The nuclear deterrent forces of the United States, according to the same statement, now include:—

Over 2,000 long-range strategic bombers—greatly outnumbering Soviet aircraft of comparable capability. This force is highly trained, completely equipped, and ready and maintained in varying stages of alert, including a large number on 15-min. ground alert, and a small number actually airborne at all times. Each of these bombers can deliver the destructive potential of several I.C.B.M.s and with greater accuracy.

Two wings of tactical bombers, each with nuclear capability, deployed on many bases strategically located in advanced positions around the World.

Fourteen aircraft carriers, several of which are deployed about the periphery of the Soviet Union. From these floating air bases, virtually invulnerable to ballistic missile attack because of their shifting positions, nuclear strikes can be made into almost any area of the Communist bloc. The aircraft in these carriers alone outnumber the heavy bombers in the Soviet Union, and they can carry weapons many times more powerful than the atomic bombs used in World War II.

Fourteen wings of nuclear-capable tactical fighters, either deployed overseas or able to move there in a very few hours.

Operational Atlas missiles ready for launching from the West Coast.

An operational squadron equipped with Snark, a 5,500-mi. air-breathing missile with a very large warhead, difficult to pick up in defence radar.

Two cruisers and five submarines equipped with the Regulus 1, surface-to-surface weapon.

Four operational squadrons equipped with a mix of Matador and Mace missiles.

Intermediate-range ballistic missiles—the Thor—in the hands of the Allied Forces in the United Kingdom, each many times more powerful than the original atomic bombs.

MEN IN THE NEWS.—Three leaders of the companies forming the new British Aircraft Corporation were together at Weybridge last week. Left to right, Sir Reginald Verdon Smith; Lord Nelson of Stafford; and Viscount Knollys. The occasion was the Vickers apprentice prizegiving.

A President Takes Office

THIS week, the Royal Aeronautical Society changes presidents. As is customary, this ceremony takes place at the annual general meeting which, this year, was scheduled for May 5.

Dr. Eric S. Moult, C.B.E., B.Sc.(Eng.), F.R.Ae.S., M.I.Mech.E., who takes over from Mr. P. G. Masefield, M.A., F.R.Ae.S., Hon.F.I.A.S., needs no introduction to our readers. He has had a long and distinguished aeronautical career as a

BATTERSEA NOCTURNE.—As reported last week the Westland private venture heliport has had a remarkably successful year. These "Aeroplane" photographs show it at night with the G.E.C. lighting system in action.

powerplant specialist and since 1957 has been technical director of the de Havilland Engine Co. He takes over his duties as president of the R.Ae.S. at an important stage of the Society's life; work is already in progress on the building of the long-awaited lecture block at the rear of 4 Hamilton Place, and this will be ready for opening during his term of office.

Born in 1903, and educated at Nottingham High School and University, Dr. Moult became an engineering student with Peter Hooker, Ltd., in Walthamstow and subsequently gained practical experience with the Gnome and Le Rhone Engine Co. and the Newall Engineering Co. Later he joined Major F. B. Halford—then in business on his own—as technical assistant and had a good deal to do with the development of the early de Havilland and pre-war Napier engines.

In 1941, continuing his association with Major Halford, he joined de Havilland and became chief engineer of the engineering departments of the Engine and Propeller Divisions. In 1944, when the separate de Havilland Engine Co. was formed, Dr. Moult was appointed chief engineer, and he became a director of the company in 1955.

Dr. Moult is no newcomer to R.Ae.S. affairs. He has been a member of Council since 1951 and a vice-president since 1956. He has served on the Propulsion Committee of the Aeronautical Research Council and has been a member of the Gas Turbine Collaboration Committee since its formation in 1941. He has also been a member of Council of the Institution of Mechanical Engineers since 1956.

VINTAGE MEN.—J. G. Weir, A. G. Board, Sir Frank Spriggs, Sir Thomas Sopwith and E. Keith Davies at the 1910 Pioneer Dinner of the R.Ae.C. on Apr. 26.

The Vintage Pioneers

MEMBERS of the Royal Aero Club turned out in force (and indeed would-be attenders were turned away in force) to do honour to the surviving air pilots who gained their flying certificates in the vintage year of 1910. The Chair was taken by the doyen of them all, the President of the Royal Aero Club, Lord Brabazon. His certificate dated Mar. 8, 1910, is the first of them all.

The guests were: Sir Thomas Sopwith (certificate No. 31, Nov. 22, 1910), E. Keith Davies (certificate No. 22, Oct. 11, 1910), J. G. Weir (certificate No. 24, Nov. 8, 1910) and A. G. Board (certificate No. 36, Nov. 29, 1910). Remembered with them and still alive, but unfortunately unable to be present, were: A. Ogilvie (certificate No. 7, May 24, 1910), C. H. Greswell (certificate No. 26, Nov. 15, 1910) and H. Barber (certificate No. 30, Nov. 22, 1910).

Speeches were made by Lord Brabazon and all the guests. It was made clear by the members how highly they regarded the part played in British aviation by Sir Thomas Sopwith to whose sterling qualities Lord Brabazon paid warm tributes.

Sir Thomas Sopwith in his speech attributed his success to those who had worked with him. He told of Harry Hawker the Australian who pulled £50 in notes out of the top of his golf stockings to pay for flying lessons. He reminded his hearers that the company, on which the fortunes of the Hawker Siddeley Group have been built up, was founded on the money the young Sopwith collected flying in the United States.

Keith Davies told of his first flight and the ubiquitous sewage farm. He disclosed the financial secrets of the contract which lured him to make the first flight in India. We heard of his part in the origin of the S.E.V.

J. G. Weir looked forward rather than back. His single-minded interest in developing the aircraft that will parachute to earth in the event of engine failure took first place in his words even on this nostalgic occasion.

Air Cdre A. G. Board in his recollections disclosed that the ways of personnel departments do not change much with the years. As he had learnt to fly aeroplanes at his own expense, he was sent to a ballooning unit and told that airships were the coming thing!

Westland Anniversaries

UNIQUE among British aircraft constructors in its all-embracing interest in rotary-wing craft, Westland Aircraft introduced a new form of entertainment in London last week to celebrate various anniversaries which fell due during the month of April. The occasion celebrated the 45th year of Westland aeronautical activity. It marked also the 26th year of the company's interest in rotary wings and signalized the completion of the first year's working of the Westland heliport at Battersea. This last-mentioned private venture, as we reported last week, ended its first 12 months of operation on Apr. 23 last. The year's total of 1,961 movements had been achieved completely free of accidents. It is hardly more than a fortnight since the largest number of movements (20) in one day was recorded.

We remarked earlier that in our experience the form of entertainment was unique. Bidden to a cocktail party the 485 guests found that after a decent interval for arrivals and departures and the usual circulation for purposes of gossip, they were bidden to seat themselves at tables where a cold buffet supper was served. There were no speeches.

In such circumstances, with plates and glasses safely and firmly in place, instead of being precariously balanced as is the custom of the all-standing cocktail party, conversation flourished. The example set by the hosts, Mr. and Mrs. Eric Mensforth, of circulating around the tables, was generally followed.

The innovation was so warmly welcomed by the guests that it will be surprising if the occasion does not inaugurate a new fashion for aeronautical occasions.

An Aerobatic Appeal

FROM the Tiger Club has come the suggestion that a worthwhile British-team entry should be made this year for both the Lockheed Trophy and the World Aerobatic Championship in Czechoslovakia, and possibly any other competitions which may be held. Over the past few years, the Tiger Club has been developing aerobatic aeroplanes in the form of specially adapted Tiger Moths, which can perform all known manœuvres and in particular all the manœuvres required in sets 1 and 2 of the obligatory figures for the World Championship.

To enter a team of the required standard, the Tiger Club estimates that it would be necessary to give six selected pilots a working-up period of 50 hours' flying each, at £6 an hour. To this £1,800 it proposes adding a further £2,250 for the preparation and maintenance of three "Bishop" Tiger Moths, and to send these three aircraft to the Championship, with the three best pilots, another £500. In all, about £5,000 would be required for this project, and the Tiger Club poses the question where this money should come from without suggesting any possible answers.

The Championship in Czechoslovakia is to be held from Aug. 28-Sept. 4 at Bratislava. The Czech Government is offering contestants the lease of Zlin Z.226 aerobatic trainers to participate in the event. Costs would comprise an entry fee of $200 for fuel, technical servicing, practice and competition flying and $484 insurance for a 10-day period (or $725 for 20 days). The minimum cost per entrant would therefore be in the region of £200.

Comet to Greece

THE first of the four Comet 4Bs for Olympic Airways was delivered on Apr. 30. Its delivery flight from London Airport to Athens was timed officially at 3 hr. 13 min. 57 sec. and this performance will be submitted in due course to the F.A.I. for ratification as a city-to-city record. Capt. Ioannidis, a senior Olympic pilot, was in command.

Olympic Airways will put the Comet into service on May 18 on routes in Europe and the Eastern Mediterranean area, timetables being integrated with those of B.E.A. Comet services. The second Olympic Comet is to be delivered later this month; the other two were ordered only a few weeks ago and will not be delivered for some time.

FIRE FIGHTING BY HELICOPTER—1.—As described below, Hunting Group Fire Organization gave an interesting display of crash fire rescue at Luton last week. Above, left, the helicopter arrives on the scene; and above right, two members of the rescue team extricate the "pilot" while the hovering helicopter keeps the flames down by its rotor downwash.

A Service Worth Developing

A REMARKABLY effective demonstration of a specialized fire-fighting technique for dealing with aircraft crash fires and extricating occupants was given at Luton Airport last week by the Hunting Group. Essentially it consists of transporting by helicopter an "advance party" of two or more members of the rescue team to the scene of the accident. By then hovering the helicopter slightly to one side of the fire, the downwash from the rotor can be made to beat the fire down to such an extent that the rescuers can walk in to remove injured occupants without the need for extinguishers or foam apparatus. Once the rescue is effected, they can be taken by the helicopter to the nearest hospital with a minimum of delay.

It is not claimed that this particular technique is altogether new—nor has the Hunting Group any proprietary interest in it. The demonstration was intended, however, to show civil airport crash and fire personnel, and others, just what could be accomplished and to indicate the possibilities.

At Luton, a scrap structural-test Jet Provost airframe, complete with dummy pilot strapped in the cockpit, was set most realistically alight with the help of a large quantity of kerosene and other inflammable fluids. A Hiller 12E helicopter belonging to Helicopter Services of Luton was standing by some distance away, and out of sight, near the control tower. It was summoned and arrived on the scene of the "crash" bearing two members of the airport rescue team; they were quickly deplaned and the helicopter at once rose to hover a little to the front and to one side of the then fiercely blazing aircraft.

This effectively held down the flames and smoke, directing them away from the cockpit area. The rescuers were in fact able to go straight in and within 45 sec. of touch-down the injured "pilot" was unstrapped, carried clear, loaded into the helicopter and on his way to the Luton and Dunstable Hospital.

Chief fire officer of the Hunting Group, Mr. V. Cable, is to be congratulated on his enterprise in seeing the potentialities of the helicopter as a crash fire damper. He told us that it all sprang from a fairly simple attempt to speed up crash fire fighting using a helicopter as a form of transport for normal equipment. In a test, having arrived at the fire with fire extinguishers, it was found that the downwash effect from the helicopter made them quite redundant.

And while on the subject of congratulations, some should certainly go to Mr. A. Lister, the pilot of the Hiller, for a nice piece of flying. There was all too little room, between the crashed and blazing aircraft and the crowd of onlookers, for him to deposit his passengers with much to spare.

The Founts of Knowledge

A CAPACITY attendance of about 65 assembled for the ninth annual general meeting and conference of the Aslib Group of Aeronautical Librarians and Information Officers, at Cranfield, Apr. 9-10. They heard papers by Mrs. Mack of Metal Industries on the administration of firms' branch libraries from central headquarters, by Professor Kapp on the presentation of information and by Leslie Wilson of Aslib on the functions of that body.

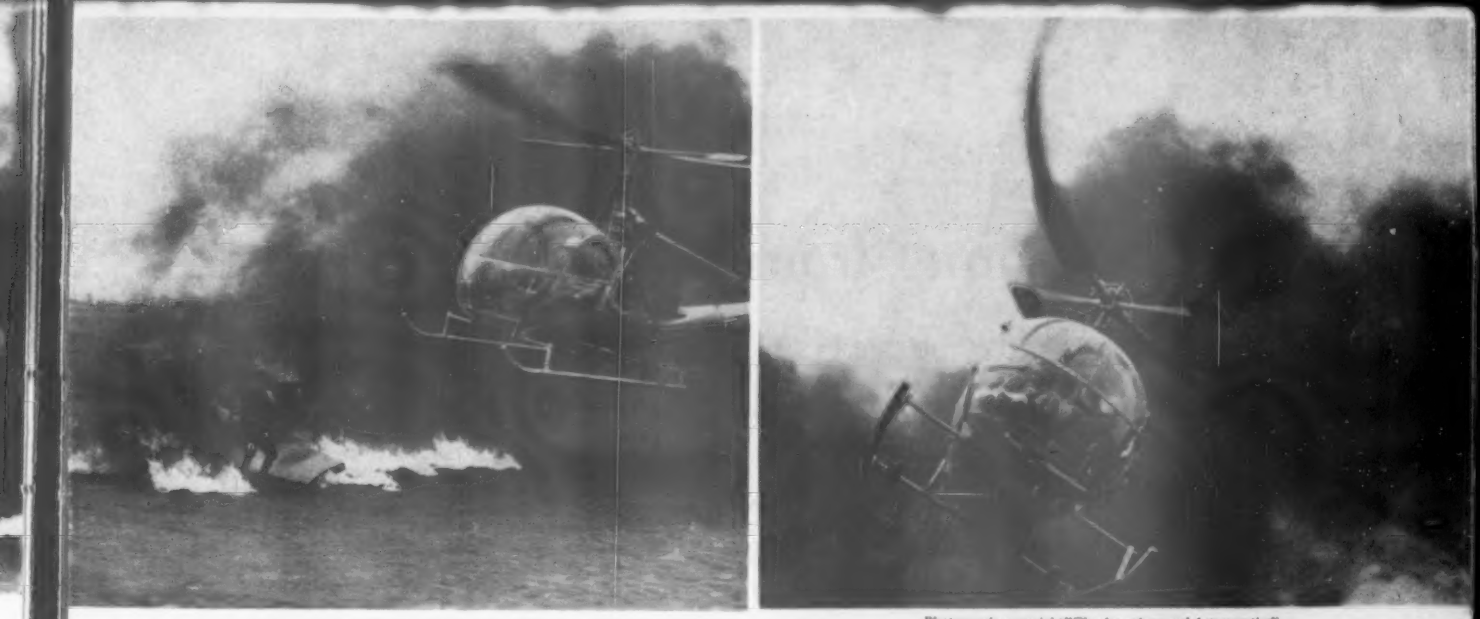
Officers for the coming year, at the end of which the Group will be celebrating its 10th anniversary, are Cyril Cleverdon, librarian of the College of Aeronautics, Miss Mary Dykes as Hon. Secretary (R.A.E. Bedford) and John Rosser (A. V. Roe, Chertsey) as Hon. Treasurer. F.H.S.

History by a Pioneer

IT is no small wonder that, with its roots deep in aviation history, the Royal Aeronautical Society—it is the oldest of its kind in the World—should take a special interest in things past as well as in current and future technological trends. As many of our readers will know this interest has recently found expression in the formation of an R.Ae.S. Historical Group.

Appropriately enough, the inaugural lecture of the newly formed Group is to be given by Sir Thomas Sopwith, C.B.E., Hon. F.R.Ae.S., a pioneer of British aeronautics who, this year, completes his fiftieth year of close association with aviation. Sir Thomas' lecture will be at the Institution of Mechanical Engineers at 18.00 hr. on May 17. And the Chair will be

BROUGH INSPECTION.—Members of the board of the Hawker Siddeley Group visited Blackburn Aircraft last week for the first time since the company was taken over by the Group. Left to right, Mr. J. A. R. Kay, Sir Roy Dobson, Mr. N. E. Rowe, Mr. T. Bancroft, Mr. A. F. Jopling, Capt. E. D. G. Lewin, Mr. J. White and Sir Thomas Sopwith.



Photographs copyright "The Aeroplane and Astronautics"

FIRE FIGHTING BY HELICOPTER—2.—Above left, the rescued "pilot" is brought out from the crash to be carried by helicopter to hospital. Above right, with the injured man safely aboard, the helicopter—a Hiller 12E of Helicopter Services—leaves the scene shortly after its initial touch down. The demonstration was most successful in showing how the rotor downwash assists rescue operations.

taken by Mr. P. G. Masefield in his new capacity as immediate past president of the R.Ae.S.

From the Society has come some brief details of the distinguished lecturer's talk. He will, it says, recall many of the "people, places and events" as he knew them from 1910 to 1921. He proposes to describe how he taught himself to fly and to discuss the first aeroplanes he owned and flew. Sir Thomas will also recall his flight in 1910 which won for him the de Forest Prize of £4,000 for the longest flight by a British pilot and aeroplane from England to the Continent. As part of the story of the early days of British aviation, he will tell how the Sopwith Aviation Company came into being and describe some of its products during the First World War until it became the Hawker Engineering Company—now Hawker Aircraft, Ltd.

Occasions on which one can hear about historical events from someone who has actually taken part in them, are all too rare these days. This, then, will be just such an occasion. It will, without doubt, be a talk—Sir Thomas describes it as his "ramblings"—which should provide a most fascinating evening's instruction and entertainment.

HAWKER DIRECTOR.—Mr. R. L. Lickley has been appointed to the board of Hawker Aircraft, Ltd.; he resigned from his post as managing director of Fairey Aviation, Ltd. when it was taken over by Westland Aircraft recently.

Research Costs

RESEARCH and development expenditure by the British aircraft industry in 1958 was about £100 million; the total for all manufacturing industry was about £300 million. After the aircraft industry came electrical engineering (£64 million) and chemicals (£43 million). These estimates are taken from a report by the Department of Scientific and Industrial Research*, which compares the 1958 figures with those for 1955, when total expenditure was £190 million. R. and D. expenditure in 1955 was 3.1% of manufacturing industry's contribution to national production; in 1958 it had risen to 4.2%.

In 1958 the cost of employing a qualified worker on R. and D. was nearly £31,000 for the aircraft industry compared with an average cost of nearly £11,000 for all manufacturing industry. It would be interesting to know exactly what the compilers of the report meant by this. Another way of looking at it, we should have thought, would be to say that a qualified worker in the aircraft industry may be doing work three times more complex.

Nearly two-thirds of research and development expenditure in 1955 came from defence contracts; in 1958 the proportion was less than a half. The science-based industries spend much more than the traditional industries on R. and D.; in the case of the aircraft industry this cost is equal to more than a third of the industry's net output.

The survey shows that the aircraft, electrical engineering, precision instrument and chemical industries have the highest R. and D. expenditures; they also receive the bulk of the defence contracts. But, as the D.S.I.R. report drily states, "it is possible that the methods of accounting employed for these contracts tend to cost to development expenditure which in other industries might be costed to production."

* Industrial Research and Development Expenditure, 1958. H.M.S.O., 1s. 3d.

August Raspet

WITH great regret we learnt from Mississippi State University that on Apr. 27 Dr. August William Raspet, Head of the Aerophysics Department, was fatally injured in an aeroplane accident. He was an active aeroplane and glider pilot who almost uniquely combined a sound theoretical approach with the urge and ability to apply theory, to devise experiments and to carry them out himself even at grave personal risk.

"Gus" Raspet was born in the U.S.A. in 1913. He obtained the Bachelor of Science degree in physics at the Carnegie Institute of Technology in 1935 and in 1940 the degree of Master of Science in Physics at the University of Maryland. He became a Ph.D. in 1942.

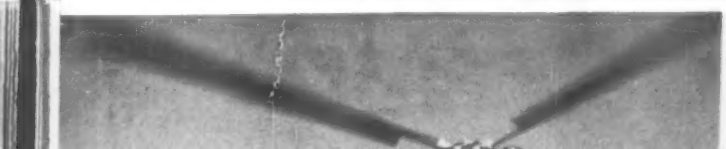
He devoted most of his life to aeronautics off the beaten tracks. He was a highly individualistic and original experimenter. He measured the performance of sailplanes, and measured the performance of a soaring bird by following it in a Kirby Kite sailplane.

Perhaps his best-known and probably his most important work was his systematic work on the reduction of drag on the RJ-5 sailplane and the "Tiny Mite" sailplane. The work on the RJ-5 has inspired many designers during the past few years.

Raspet's obsession with drag led him naturally to boundary-layer control and a series of reports by him and his colleagues indicated a very great activity and promising results. Less than a year ago this background work was brought to fruition by a government contract for Raspet to build a series of small turbine aeroplanes to develop and perfect his ideas into a practicable highly efficient small transport.

There was probably no aspect of low-speed flight to which Gus Raspet did not contribute. His bird-following led him to the study of laminar boundary-layer conditions in natural flight. His drag-reduction activity led him to reconsider the problem of man-powered flight. What may prove to be his last paper (to be published about now) is on "Biophysics of Bird Flight" which shows in straightforward technical language how much better birds are than aircraft.

Gus Raspet leaves a wide gap in the neglected slow-speed end of aviation. He will be deeply missed not only in his own country, but in many other lands where his work and ideas have been a great inspiration.—B.S.S.



Scratching from the Space Race

AFTER scanning the newspapers and listening to broadcast reports about the debate in the Commons last week on the cancellation of work on Blue Streak as a military weapon anyone might be excused for feeling that it would be too exhausting to read the report of the whole proceedings in Hansard. Yet to do so is illuminating.

As a result of the condensation and selection necessary for the daily newspapers certain aspects received much publicity and others very little. Moreover, the political atmosphere was such that the technical aspects of the problem tended to become submerged in floods of comment regarding the change of front in the Opposition thinking about defence. That is an aspect which we do not propose to explore.

To us the position disclosed in the Hansard report appears terrifyingly close to the situation reached between the Wars when the armaments cupboard was as bare as Mother Hubbard's. In some ways the position is worse because the contents of the cupboard are fairly adequate at the moment; it is the future state of the armaments larder which causes us so much concern.

For instance, let us take the disclosure that it took this country until 1954 to begin effective action on the production of a ballistic missile. We have Mr. Sandys' authority for this. It was in 1954 that, as Minister of Supply, he went to the United States to discuss the possibility of obtaining a suitable weapon from that country. Because he was unable to do so, work started on Blue Streak. It is indeed a disquieting thought that after such effective demonstration by the Germans in 1944 of what ballistic missiles could do that 10 whole years could elapse before this country set about profiting from its experience.

Six years have passed since the decision was at last taken to start work on a ballistic missile. The weapon then begun is now cancelled and the Government has made it clear that no plans exist for further development at this stage. We intend to rely upon developments in the United States.

Non-starters to the Stars

Influential groups in this country have made it clear that international defence thinking has already moved out into space. Neither Great Britain nor the Commonwealth have any comprehensive space plans. Today, the country faces the terrifying possibility—it might well be said, likelihood—that advantage will not be taken of the work on Blue Streak to develop our own satellite-launching techniques.

It seems to be accepted by the Government that by forgoing the expenses of developing our own defences we can buy them in due course ready made from our friends. This as a proposition in economics seems quite incomprehensible. It is true that weapons may be regarded as a form of capital investment that does not earn a profit. But they have still got to be paid for whether they are bought from friends or made at home. In either case the money spent is not available for raising the standard of living or adding to the amenities of the welfare state. The important difference is that if the development and manufacture are done at home we have taught ourselves new techniques and developed new skills to earn our living in the market-places of the World. This is an aspect which gets little study outside the engineering profession. Engineering and associated developments in electrical and chemical engineering lie in the fields which provide most export profits. It is beside the point to say how much better the money would be spent on welfare objectives.

Mr. Aubrey Jones, the former Minister of Supply, put the engineering aspect with some force in his contribution to the debate. In all the reports we studied only Hansard did him justice. In the early part of his speech he made the observation that an alliance consisting of a major partner and a minor partner, in which the minor partner leans passively on the major partner, is a weak and insecure alliance. On the other hand, an alliance in which the minor partner makes a contribution of importance and significance in fields which the major partner considers to be significant is a much more secure and reliable alliance.

Mr. Jones disclosed it was this kind of contribution which this country had made in the design of nuclear warheads. It was an historical fact, he asserted, that as a result the Anglo-American alliance was drawn closer together.

In his speech he emphasized that whereas no speaker had questioned the wisdom of the Government's decision, he himself had grave doubts. In a passage of some irony he recalled that in 1957 the present Minister of Aviation, then Minister of Defence, called for a review of the entire military development programme and addressed himself to the question whether he should keep in being a supersonic bomber or keep in being Blue Streak. He might, said Mr. Jones, have argued exactly what the Minister of Defence is arguing at this time that the supersonic bomber, equipped with guided missiles of longer and longer range, would have given him the mobility which Blue Streak did not give. Indeed, the great controversy which took place at that time between those in favour of manned aircraft and those who believed in the guided missile was precisely about that. Nevertheless, the then Minister of Defence, now Minister of Aviation, decided to cancel the supersonic bomber and retain Blue Streak. What Mr. Jones did not say in ironic conclusion was that now we have neither supersonic bomber nor missile.

Eggs Cost More than Blue Streak

It is this complete lack of continuity and determination to see things through which present the most terrifying disclosure of the debate. Mr. Jones' subsequent points are well worth study. He had a devastating reply to those who deplore the size of our military expenditure when he pointed out that this country is today spending far more in agricultural subsidies than on the total military research and development programme. It will be news to many, we suspect, that the annual expenditure on the egg subsidy, which has been going on far longer than Blue Streak, is at least 50% higher than the annual expenditure on Blue Streak.

Finally, he roundly declared that this is a technological age. We agree with him that this country is unlikely to continue to exert any influence in the World if it deliberately walks out of one of the most significant technological fields which has been opened up for a long time.

The former Minister of Supply was not the only member who stressed the engineering and scientific importance of Blue Streak. Mr. Woodrow Wyatt, who followed him, made the point that in dropping the military development of Blue Streak we have, as a country, dropped the possibility of having a rocket programme of our own. Within 10 years the Americans will be able to fire their own missiles from inside the United States to anywhere in the World. In such circumstances, can we be certain that they will still go on supplying us with Skybolt and Polaris. In 10 years the European countries may well have their own nuclear deterrent and then, asked Mr. Wyatt, where will this country be?

Space and the Common Market

We are dropping out of a major military development for the sake of only a few million pounds. If development of Blue Streak does not go on then we have discarded any possibility of entering the space age and reaping all the technical by-products which can flow from that kind of activity. Sir Arthur Vere Harvey asked the Minister not to drop Blue Streak as an instrument for space research and pressed him to tell the House frankly what he plans to do about space research. Another speaker, Mr. Rupert Speir, said that if we could work together on atomic power for peaceful purposes he did not see why the Western European nations should not work together on space research.

It would have been unreasonable to expect in the general atmosphere of the debate that much time should have been devoted to this particular aspect. Yet it may well be the sensible way forward.

It is clear that the struggle to get man into space is well advanced. It is equally clear that the maintenance of peace in the World will, before many years are past, depend on the ability to put into orbit satellites able to keep watch and ward (or, in the longer-winded modern term, surveillance) over the nations of the World. Moreover, these observatories will need to be manned for military action. It is important that Western Europe should be ready to play her part. How many people realize that the European Common Market, consisting of Belgium, France, Italy, Luxembourg and the Netherlands, with a total population of 160 millions, forms one of the largest trading blocks in the World. We have already seen the effects of the new links on our military aircraft business. Are we sure that we wish to scratch at the start of the race into space?

T.J.

Gnome to Power R.A.F. Whirlwinds

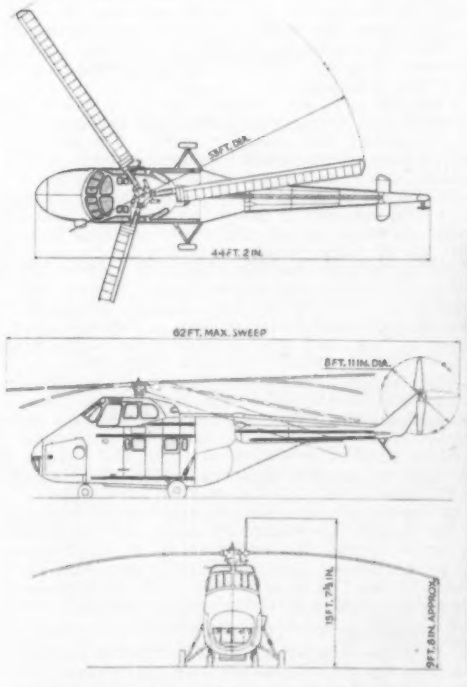
AS we briefly recorded last week, the Westland Whirlwind has been given a new lease of life by the decision to re-power R.A.F. Whirlwinds with de Havilland Gnome turboshaft engines. These helicopters are in service with the R.A.F. and the Royal Navy; the R.A.F. also operates them on behalf of the Army. They are used as troop and passenger transports, for ambulance work, freighting and rescue duties, and in the anti-submarine rôle.

New Mk. 10 Whirlwinds for the R.A.F. will be built with Gnome engines from the start. As the Mk. 10s enter service, piston-engined Whirlwinds will be withdrawn and re-engined with Gnomes. Whirlwinds of the Royal Navy may also be re-engined with Gnomes.

A licence-built version of the General Electric T58, the de Havilland Gnome has a 975-s.h.p. one-hour rating. But because the helicopter transmission is limited to 750 s.h.p., Gnomes will be derated to this power when installed in Whirlwinds. On the other hand, with the engine's reserve power in this particular application the 750-s.h.p. output can be maintained up to a considerable altitude and in the high-temperature conditions of tropical operation, thus improving the Whirlwind's performance.

The Whirlwind's payload will benefit from the lower weight of the Gnome, which gives a 675-lb. saving in the equipped weight of the aircraft. Maximum fuel capacity has been increased from 145 to 170 Imp. gal. to improve the range.

In the Gnome-powered version the standard gearboxes and transmission of the piston-engined helicopter are retained. The helicopter's nose has, however, been redesigned to take the new engine, which is mounted horizontally, but offset to the left of the centre line. Larger doors and a folding fuselage nose section give easy access to the engine and an electrics bay beside it.



OFFSET INSTALLATION.—Excellent accessibility is a feature of the Gnome installation; the engine takes up little of the volume available.

LONG NOSE.—Main recognition feature of the Gnome Whirlwind (top left) is its extended nose, which makes the fuselage 29½ in. longer than on the piston-engined Whirlwind 5 (above).

Westlands will continue to offer military and civil Whirlwinds powered by Pratt & Whitney and Alvis piston engines as well as the Gnome version, which will, naturally, be more expensive than the piston-engined types.

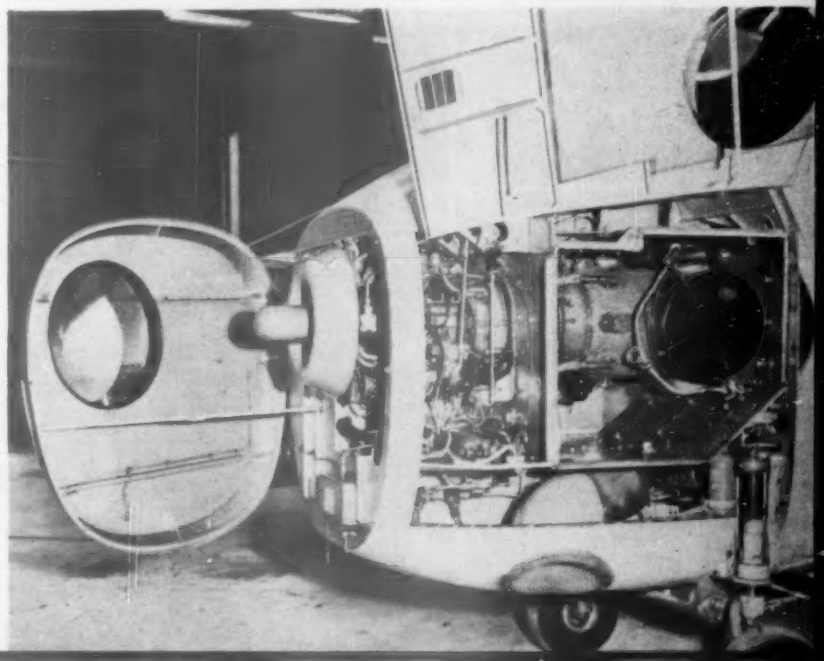
Technical Data

(Piston-engined Whirlwind Mk. 5 figures in brackets.)

POWERPLANT.—One de Havilland Gnome turboshaft, derated to 750 s.h.p. at take-off (one Alvis Leonides Major piston engine, 750 h.p. at take-off).

WEIGHTS.—Equipped, 4,761 lb. (5,436 lb.); payload with 145 gal. fuel, 1,846 lb. (1,254 lb.); max. all-up, 8,000 lb. (8,000 lb.).

PERFORMANCE.—Rate of climb at sea-level, 1,100 ft./min. (1,080 ft./min.); max. speed at sea-level, 109 m.p.h. (109 m.p.h.); range with 145 gal. fuel, 275 miles (335 miles).



Air Transport

B.O.A.C.'s Better Year

DURING the Corporation's 1959-60 financial year B.O.A.C. made the highest operating profit in its history—more than £4m.—and expects to record a surplus, after paying interest, of about £100,000. These figures cover the Corporation's own operations; B.O.A.C. Associated Companies incurred a deficit, after interest, of about £1.1 million.

These provisional results compare very favourably with the 1958-59 figures, which were: profit on operating account, £996,112; deficit after payment of interest, £2,084,651; provision for losses of subsidiary companies after payment of interest, £3,094,769; total deficit, £5,179,420. So, overall, B.O.A.C. and its subsidiaries appear to have improved their financial situation to the extent of about £4 million.

N.Y.A. Reports Progress

FURTHER advances in the development of scheduled helicopter services are announced in the 8th annual report of New York Airways. The number of passengers carried in 1959 increased by 37.2% and the average load factor improved from 44.6% to 49.2%. For the first time in the company's history, commercial revenues exceeded one million dollars. The Federal subsidy, however, once again represented more than half of the total revenue of the company—$2,242,355 in subsidy and $1,086,981 in commercial revenue.

Because of higher operating expenses, particularly associated with the introduction of new equipment and the opening up of new routes, the net income for the year fell to $25,153, the lowest for six years and representing only 10 cents per share, compared with 47 cents a share in 1958. N.Y.A. is now asking the C.A.B. for an interim increase in the subsidy mail rate. Rates had previously been established by the C.A.B. for the five years beginning Jly. 1, 1958. Over the past six years, the subsidy received by N.Y.A. has reduced from $25.35 to $8.55 per scheduled ton-mile.

The company's original operating authority was a five-year temporary certificate of public convenience and necessity, which expired on Mar. 31, 1957. Since then, N.Y.A. has been seeking a permanent operating authority, for which it received the support of the C.A.B. chief examiner. The C.A.B. itself has, however, not accepted the examiner's recommendations and has now renewed the authority for a seven-year period, starting May 17, 1960. At the same time, the restriction on equipment was removed, the C.A.B. saying, ". . . if the type of service now being offered by conventional helicopters can be provided more effectively with equipment not technically qualifying as rotary-winged aircraft, there is no sound reason to delay the use of such equipment."

As already announced, the next stage of re-equipment will be the purchase of 10 Vertol 107 Model II-2 helicopters, the first five of which are for delivery in the spring of 1961. Basic price for the first five aircraft is given as $2,363,125, "subject to adjustment for engines, installed and spare, optional equipment . . . spare parts and ground support equipment." The Vertol Division of Boeing Airplane Co. will accept the five Vertol 44Bs used at present, in part payment, the remainder of the price to be obtained through a Government-guaranteed loan.

The N.Y.A. report notes that the 65-seat Rotodyne should be available in 1965. The company has placed a letter of intent for five and has preferred production-line positions for 15 more.

CAMBRIDGE CUSTOMS.—Customs facilities are now available at Cambridge Airport, which is privately owned by Marshall's. Private aircraft can be cleared only if their movement coincides with scheduled or pre-planned charter operations. This map shows the area of which Cambridge forms the centre. It is soon to have competition from Luton.

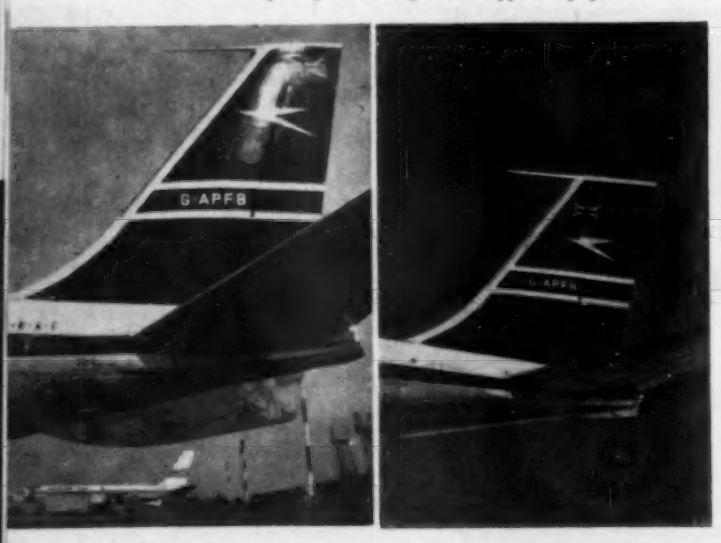
Too Many Airlines?

CAPITAL AIRLINES' present difficulties, which appear to be almost insuperable, provide a practical illustration—if one is needed—of the dangers inherent in over-competition. The suggestion was made by Mr. C. R. Smith, president of American Airlines, in a recent speech that too many airlines are competing for traffic on the U.S. trunk lines. The situation has arisen from the C.A.B.'s eagerness to provide the best possible service for the public, Mr. Smith suggested; the result is that on some routes the loads available to each carrier are below the level of reasonable opportunity for profit for an efficient operator. The net result is that the public may be paying more than it should.

Action is needed now, Mr. Smith suggests, to reduce the number of airlines on some routes if the total U.S. trunk-line industry is to operate with adequate profit. The idea that there should be some rearrangement of routes and services needs encouragement, both from business and from government.

Mr. Smith did not go so far as to suggest airline mergers in as many words, although he referred to the similar situation with the railroads where mergers are now taking place because "the market will no longer support so great a total number of carriers." To the outside observer, it certainly appears that a merger is now the only course open to Capital Airlines, whose troubles spring in part from the very situation described by Mr. Smith. The alternative suggestion of a Federal subsidy, which Capital has requested, does not seem to be gaining much support.

Among other points made by Mr. Smith was the difficulty of selling seats on piston-engined aeroplanes because "the jet has almost done too good a job." American Airlines has on its books over $50 million in depreciated values for piston-engined aircraft. More freedom should be given by the C.A.B., he suggested, to allow fares to rise and fall in accordance with the forces of competition. "Just now, fares are too low. No carrier is making enough to provide adequate investor encouragement, but the needed rate adjustment must await government regulating action." This is a reference to the long-awaited conclusion of the General Passenger Fare Investigation, which was instituted by the C.A.B. in August, 1957. It is generally believed that this report will recommend an increase in fares.



B.O.A.C. BOEING.—The first of B.O.A.C.'s 707-436s arrived in this country on Apr. 29, followed by the second two days later. These photographs show the new and old tails on the 707; the modifications required by the A.R.B. included a 37-inch upward extension of the fin and the 20-ft. ventral "bumper" (left) as well as changes in the control circuits.

EVEN BETTER THAN PROMISED

Before the first Vanguard goes into scheduled service, and little more than a year after the first flight tests, development has made possible dramatic increases in maximum operating weights. Details are given in the table below. These improvements have been achieved for an empty weight increase of only 600 lb, and allow a margin of 1,600 lb for future development, equipment changes or customers' special requirements.

VANGUARD PAYLOAD UP BY 8,000 lb

	Original specification	New specification	Increase
GROSS TAKE-OFF WEIGHT	141,000 lb	146,500 lb	**5,500 lb**
MAX. LANDING WEIGHT	121,000 lb	130,500 lb	**9,500 lb**
MAX. 'ZERO FUEL' WEIGHT	112,500 lb	122,500 lb	**10,000 lb**
MAX. PAYLOAD	29,000 lb	37,000 lb	**8,000 lb**

The Vanguard can now carry 139 economy-class passengers plus over 8,000 lb freight. Without intermediate refuelling, 100-passenger payloads can be carried over such important consecutive sectors as London–Frankfurt–Vienna–Prague.

Operators with profit in mind and air travel for all in view, will find the Vanguard is more attractive than ever.

VICKERS VANGUARD

FOUR ROLLS-ROYCE TYNE PROPELLER-TURBINE ENGINES

The airliner with the biggest profit potential ever offered to the operator

VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED WEYBRIDGE SURREY

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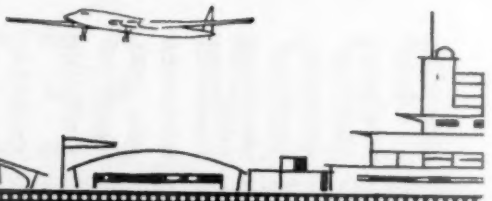
to serve you better



GOODYEAR AND ELECTRO-HYDRAULICS

In their new joint manufacturing agreement Goodyear and Electro-Hydraulics are combining resources to give better service right from the drawing-board to the periodic overhaul. Electro-Hydraulics are giving improved production facilities for Goodyear designed wheel and ancillary hydraulic design. Goodyear are taking the opportunity to improve their servicing facilities at Wolverhampton and London Airport to handle a growing volume of work with higher efficiency than ever.

EH LIMITED

GOODYEAR AVIATION DIVISION

FOR EVERYTHING UNDER THE AIRCRAFT

GOODYEAR: AIRCRAFT TYRES · WHEELS · BRAKES · ANTI-SKID EQUIPMENT
ELECTRO-HYDRAULICS: RETRACTING GEAR · U/C CONTROL SYSTEMS · HYDRAULIC SYSTEMS

DC-8 ARRIVALS.—On Apr. 27, Pan American flew a DC-8 into London for the first time, on service from New York. On Apr. 30, the type started operation of a twice-weekly service from Chicago, Detroit and Boston to London, Hamburg and Dusseldorf; Shannon and Frankfurt will be added to this route on Jne. 1 when the frequency is doubled. Pan American DC-8s (top) seat 28 first class and 93 economy-class passengers. S.A.S. introduced DC-8s on the routes to New York on May 1; the picture shows the first aircraft arriving at Stockholm Arlanda. The first Swissair DC-8 arrived in Zurich on Apr. 24 and will enter service on May 30.

Air Transport . . . .

Electras Still Restricted

A COMPREHENSIVE inspection of the 112 Lockheed Electras in service with U.S. domestic operators was completed towards the end of April. According to the F.A.A., nothing was found in these inspections which would warrant grounding the Electra or imposing further limitations on its operation. The restrictions already imposed (see our issues for Apr. 1, p. 401 and Apr. 8, p. 426), are still in force, however. They limit the Electra's speed to 225 knots I.A.S. at 15,000 ft. (which is 80 knots below the normal cruising speed limit at this altitude), specify strict adherence to fuelling recommendations and restrict the use of the auto-pilot.

The massive effort being put into the investigation of the cause of the two Electras breaking up in the air is meanwhile continuing—at a cost to Lockheed, according to one report, of some $25 million. The programme includes a full static test on a typical airframe and flight trials with a strain-gauged example in areas of extreme turbulence over California.

IFALPA at Work

SEVERAL important recommendations and resolutions were passed during the Mar. 22-29 annual conference of IFALPA in Istanbul. Amended proposals for defining the landing distance required, the reference landing distance on which the former is based, and the maximum and target threshold speeds, were recommended to national certification authorities. A revised stalling speed definition was also recommended to the ICAO Airworthiness Committee.

One of the more interesting resolutions was not, in fact, ratified. This concerned the minimum operational requirements for future long-range navigational aids to meet the increase in traffic density and the need for a reduction in lateral separations. It was proposed that the information provided by this equipment should include ground speed, track, deviation from flight plan, and the bearing and distance of the aircraft from any arbitrary geographical point. The accuracy should be such that a fixing error of less than 4 naut. miles should be applicable on at least 95% of occasions. An essentially undistorted pictorial display was proposed, with simple transition from and to short-range or terminal navigation aids.

It was also resolved that the Federation should exert appropriate pressure on international organizations to request the Brazilian Government to establish a joint committee to review the airway system in the area.

Among other resolutions and recommendations were: that the scope, headings and format of flight manuals should be standardized; that a special study group should be instituted to investigate supersonic flight; that runway centre-line systems should be installed as integral parts of any proposed runway lighting system; that the capability of A.T.C. officers everywhere in the World should meet ICAO standards; and that the short-term employment of such officers was unsatisfactory.

B.E.A. TRAFFIC RESULTS—FINANCIAL YEAR 1959/60

	Financial Year ended 31 March, 1960	Financial Year ended 31 March 1959	Variation
Capacity ton miles offered ..	191,992,000	181,055,000	+ 6.0%
Load ton miles sold	130,032,000	109,366,000	+ 18.9%
Revenue load factor	67.7%	60.4%	+ 12.1%
Passengers carried	3,289,606	2,828,715	+ 16.3%
Passenger miles flown	1,153,785,000	988,329,000	+ 16.7%
Passenger load factor	69.4%	62.5%	+ 11.0%
Freight ton miles	14,894,000	11,620,000	+ 28.2%
Mail ton miles	4,001,000	4,058,000	— 1.4%
Aircraft miles flown	37,366,000	35,899,000	+ 4.1%
Revenue hours flown	193,790	194,058	— 0.1%

These statistics indicate the progress made by B.E.A. in 1959/60. As reported last week, a profit of about £2 million was made.

The Air-freight Business

SOMETHING of the cargo-terminal development requirements needed to match the big-capacity freighters of the future could be gauged from the contents of a recent Canadair sales publication. This (subject to the effect of one or two newer thoughts on the whole problem) dealt with the Canadair concept of an integrated air-cargo system.

Productivity of the CL-44, like that of any other specialist freight aircraft, depends on fast turnrounds. These, in their turn, depend on mechanized loading systems. The CL-44 cargo distribution, for maximum efficiency, is visualized as consisting of 10 pre-loaded pallets in the main hold; bulk loading (i.e. manual packing) in the swinging-tail section of the fuselage and in the forward underfloor compartment; and pre-loaded bins in the aft underfloor compartment.

The pallets are winched into and out of the hold, and the four bins are loaded and unloaded in train on rollers through a below-floor entry at the rear fuselage break. The entire handling system, when in full use (see the issue of Mar. 4, page 275) weighs between 3,100 and 3,400 lb. according to the types of pallet and securing methods used.

But the equipment in the aeroplane is only a part of that needed for the reduction of turnround times. At secondary bases (and elsewhere until such a time as fully equipped terminals are built) it will obviously be necessary to manage with normal mobile equipment such as fork-lift and scissor-lift trucks and special ramps. Even for these small-scale operations Canadair has proposed a special self-powered elevator truck with a capacity of 30,000 lb., but the main thinking has been directed towards schemes suitable for really busy terminals where the freight "turnover" is, or is likely to become, really considerable.

One such scheme visualizes the use of a traversing ramp which is moved on flush rails across the apron to a position in line with the rear fuselage entry. The transporter would carry 10 pallets on the upper deck, where there would be powered rollers. The bins would be loaded by power belt from an underfloor compartment in the ramp.

Another scheme involves the use of fixed, vertically adjustable, ramps extending endwise from a high-level sill at the

SOMETHING NEW.—A wholly timber-framed hangar, the first in the U.K., is now nearing its final erection stage at Gatwick. With a clear internal span of 150 ft. and a roof beam height of 33 ft., it is being built for Overseas Aviation by Beves & Co. (Structures), Ltd.

Air Transport . . . .

terminal, where the special pallets and bins would be loaded and moved into position on train-trucks. This second scheme seems to be the more acceptable, because of its greater possible flexibility.

But all of this does suggest that the airlines and the airport owners will need to plan both early and well. The CL-44 is not likely to be the only all-freight, end-loaded, big-capacity aircraft in service three or four years from now. Nor are suitable terminal cargo facilities likely to be able to grow gradually as the needs demand; they must, it seems, be planned in advance and in permanent detail.

Derby Airways Plan

FROM the end of May, Derby Airways will join the growing number of operators at Bristol and Cardiff Airports (see our issue for Apr. 8, 1960). On May 28 the company will inaugurate its Cardiff-Ostend service, at a frequency building up to five a week by the end of June; a separate Bristol-Ostend service will start on Jne. 5, operating twice a week. On May 31, a service to Palma from Cardiff and Bristol will be inaugurated and will operate twice a week; a weekly Cardiff-Bristol—Luxembourg service will open on Jne. 3, and a weekly Cardiff-Perpignan service on Jne. 10.

All the new services will be operated this season by 36-seat Dakotas. Other scheduled services operated by the company using Marathons as well as Dakotas are based on Derby—Luton—Birmingham—and Northampton, Cambridge and Staverton. In addition to inclusive tour charters the company undertakes a considerable amount of freighting and specializes in aero-engine freighting. A regular commitment is to fly Rolls-Royce Avons to Toulouse for the Sud-Aviation Caravelles; about 50 have been delivered already this year.

Derby Airways is one of the six companies which, as reported in our Apr. 22 issue, are discussing some measures of integration. Gp. Capt. C. A. B. Wilcock, who has taken the chair for these discussions, is Derby's chairman. Its first managing directors are Wg. Cdr. H. A. Roxburgh and R. R. Paine (who will be remembered as one of the original Throttle Benders in the earlier post-war National Air Races).

Institute of Transport 1960 Congress

Looking Ahead

SINCE air transport is only one part of the business looked after by the Institute of Transport, it was to be expected that the problems and politics of movements on or very near the surface should have provided the bulk of the interest for the Institute's 1960 Congress. Nevertheless, as briefly recorded last week (page 502), one of the three papers dealt exclusively with air transport.

In this, Mr. Peter Masefield took a personal look at the present and future prospects, his subjects ranging in a short paper between travelling-time anomalies, supersonic and VTOL possibilities, traffic potentialities and fare levels. The anomalies on short-haul services were such that the speeds between city centres bore little relation to those between airports. A table in the presented paper showed that the actual London-Paris travelling time had not decreased in the 20 years since 1939. In that year the elapsed time (flying by A.W. Ensign from Croydon to Le Bourget) was 3 hr. 40 min. (59 m.p.h.); in 1959 the time from centre to centre was just the same.

Nevertheless, he thought that on short- and long-haul services there was a prospect during the next decade of much greater advances in speed than in any previous 10-year period. The helicopter could reduce the London-Paris time to 1 hr. 45 min. (121 m.p.h.) and the supersonic transport might offer the prospect of a decrease in London-New York centre-to-centre time from today's 9 hr. 50 min. (350 m.p.h.) to 5 hr. 30 min. (630 m.p.h.) in 1969.

The future helicopter and the long-range supersonic transport services were likely to involve premium fares, while the low-fare services, on which air transport development depends, would continue to be operated with conventional aeroplanes, thus causing air traffic to develop in three quite distinct forms. Present estimates suggested that the operating costs of an M=2.2 transport would be about the same as those of the present subsonic jet. Its payload capacity was likely to be smaller, but this might be balanced by the greatly increased productivity. Helicopter costs were likely to remain some 20% above those of comparable fixed-wing aircraft even for ranges below 250 miles.

On the subject of costs, Mr. Masefield showed how operating expenditure and revenue rates had come down steadily during the years, but made the important point that seat-mile costs of the big turbojets have been brought down more by their increased capacity than by improved techniques. The fact that the long-range jet could carry up to 180 passengers—twice the number in the aircraft which they have replaced—was the biggest influence in reducing specific costs. Today's turbine transports were showing, on average, a break-even load factor of a little more than 40%, by comparison with 57% for piston-engined aircraft.

In his spoken address at the Congress, Mr. Masefield considered that there would inevitably be a big increase in the number of private and executive aircraft on this side of the Atlantic. He insisted that the air was not crowded and that there was plenty of room for properly equipped private aircraft, making the point that even in the U.K. control zones there was an average of only 28 aircraft airborne in these at the same time.

Supersonic transports, he said, were "inevitable"; the airlines might not look happily at the prospect, but in due course "some cad" would order such aircraft and the rest of the operators would have to follow.

Answering questions and comments from the floor, he said that he did not believe that the Hovercraft would be a practical proposition for Channel operations within a four-year timescale and that, therefore, a new generation of vehicle-ferry aircraft *and* a Channel tunnel would be needed. He thought that, so far as take-off and landing safety was concerned, air transport was now in its worst position ever, but that turbofans and, later, automatic take-off/landing equipment, would gradually improve the safety situation.

It was interesting, during a previous discussion on shipping matters, to hear the suggestion that more attention should be paid to reducing fares and less to providing passenger amenities on the North Atlantic—and even more interesting to listen to the reply from Sir Donald Anderson, the P. and O. chairman. He said, in effect, that the only way to reduce shipping fares was to reduce the space allotted to each passenger, but that there would undoubtedly be complaints if passengers were offered inferior accommodation even at lower fares.

The Congress was opened on Apr. 27 by Mr. Ernest Marples, Minister of Transport, and just for once we regretted that aviation had been removed from the influence of the transport ministry. Mr. Marples talked about railways, roads, city planning and a lot of other things; the nearest he got to air transport was in a reference to applications of the cushion-craft principles.

Avro 748s for Aden

NEWS of the Aden Airways order for the Avro 748 to supplement its ageing DC-3 fleet brings a reminder of the very hard, if unspectacular, work being undertaken by this B.O.A.C. subsidiary company in some of the most desolate parts of the World. The fact that these duties are being completed not only successfully but profitably, despite uneconomical aircraft, non-IATA rates and one of the worst maintenance environments possible, says a great deal for the efficiency of its operation. Its staff of about 450 (including 28 pilots for 14 crews), which is centred on Aden under Mr. H. W. C. Alger, the general manager, operates a fleet of seven DC-3s and two Argonauts, the latter soon to be joined by a third.

In the past financial year, Aden Airways has earned well over £1 million revenue, and its profit is expected to be in the region of £100,000. This represents a considerable improvement over the £30,000 profit of the previous financial year, and was made possible not so much by cutting costs, which is virtually out of the question in such an area, but by inereased utilization and very high load factors. Utilization has totalled about 15,000 hr. per year for the DC-3 fleet, and may reasonably be expected to show a substantial increase following the appearance of the Argonauts.

The first of these arrived from the U.K., ex-B.O.A.C., in mid-February, and completed more than 120 hr. in its first month, which included training sorties, when it was joined by the second DC-4M. Fitted with 54 seats, the Argonauts are likely to be in great demand for leave charters, to take troops from Aden to Mombasa (Kenya) and elsewhere, for which their long-range capabilities make them most suitable. They are also invaluable for the pilgrim schedules to Jeddah, and there was a recent commitment for some 70 of these flights.

The Argonauts are already beginning to relieve the DC-3s on some of the longer services, which extend from Aden as far afield as Khartoum, via Asmara, and Nairobi and Bahrain. But for much of the bread and butter work of Aden Airways, which operates into the inhospitable desert of Southern Arabia, to such exotic-sounding places as Raudha, Qatn, Ghuraf, Nisah, Mahfid and Ataq, only the venerable DC-3s are at present able to meet the challenge of the rocky and primitive airstrips.

Why the 748?

The development of the Avro 748 is therefore of particular importance to Aden Airways, and the arrival of the first aircraft in 1962 will begin to pave the way for the honourable retirement of the DC-3. The 748, in being able to operate under the conditions of these desert routes, is one of the few designs worthy of description as a DC-3 replacement, and it is expected that the three Series 2 aircraft for Aden Airways will replace at least five of the ancient Dakotas. Once proven in that area, the Avro 748 is likely to be in additional demand to take over the entire DC-3 commitment.

The 748s will each carry 40 passengers and, to meet the extremes of airfield elevation and air temperatures, will be Series 2 aircraft with the higher-powered Rolls-Royce Dart R.Da.7 turboprops. Some of the Aden Airways' flight captains and other personnel are already studying the operating procedures of the 748, which will have a range, while carrying a maximum payload of 9,660 lb. and adequate reserves, of more than 800 naut. miles. Cruising speed will be 260 knots, so that the all-round improvement over the DC-3 is likely to be substantial.

In the meantime, the Douglas transports continue to do an extraordinarily difficult job with success, although at a relatively heavy cost. Aviation is down to its basic level in that part of the World, often being the only practical means of travel, and is used by relatively primitive people as casually as surface transport is accepted in the West. Many of the Arab passengers travel with their bedrolls and other personal effects, and spare capacity in the aeroplanes is always taken up to the full with freight.

In the desolation of the Aden area, the aerial import of about 95% of all vegetables and meat into the Colony, mostly from East Africa, is of particular importance. One of the many unusual jobs undertaken by Aden Airways is the daily import of some 5,000 kg. of Qat, which is a bush leaf with narcotic qualities greatly in favour for chewing by the natives. It comes mainly from Dire Dawa, in Ethiopia, and retails for about 18s. per kg.

Its carriage now provides a steady commitment for Aden Airways, which has six of its seven DC-3s in service per day. It is also called upon to carry other odd horticultural loads, such as a recent batch of 500 citrus trees to Beihan, in the Western Protectorate. Farther east, Aden Airways has taken over some of the military support flying from the R.A.F. and is taking freight into some of the peripheral Arabian strips. Masirah Island, on the extreme tip of Oman, is typical of these, although rather larger than the interior strips.

Frequently, these are no longer than 1,000 yd. and are simply areas of desert demarcated by rows of oil drums. On some of them there are vehicle-mounted radio beacons, made up from old Bendix aircraft sets by the radio department of Aden Airways, while others have virtually no facilities and are strictly fine-weather strips. One of the recent commitments involves flying into the Oman desert in support of an oil exploration team, which is supplied solely from the air.

This sort of background, which does not exclude the odd bullet hole through the airframe from a trigger-happy tribesman, is the formidable setting awaiting the DC-3 replacement. Other requirements, which decided the choice of the Avro 748, included sufficient airscrew and fuselage clearance from flying stones, and an immense versatility. The nosewheel undercarriage is not likely to be initially popular on marginal strips, but may become very much so if it permits the introduction of reverse pitch.

It is perhaps obvious from this brief description of Aden Airways activities why it is not possible to expect IATA fare rates. The need for economical aircraft is further illustrated by the fact that it now costs almost as much to overhaul a DC-3 for a Check IV in Aden as it does to buy one, because of the expense of spares from reputable companies and the high salaries and allowances which it is necessary to pay to the engineering staff. Add to these the major corrosion problem presented by the combination of sand, salt and gypsum at the Khormaksar main base and the reduced overhaul life of 900 hr. for the Twin Wasp engines in such tropical conditions, and Aden Airways' eagerness to become the first overseas customer for the Avro 748 becomes understandable.

JOHN FRICKER.

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CONTRACT CONCLUDED.—Signing the Aden Airways contract for three Avro 748 Series 2s in London last week were Mr. J. A. R. Kay and Sir George Cribbett. Mr. J. W. Booth, chairman of Aden Airways (right) looks on.

ETHIOPIAN IDYLL.—Typical operating conditions for the Avro 748s on order for Aden Airways are illustrated by this photograph of an A.A. DC-3 at Asmara, an airfield 7,628 ft. a.s.l. in the tropics.

The Fighting Services

Middle East Appointment

AIR COMMODORE T. W. PIPER, C.B.E., A.F.C., is to become Chief of Staff to the Commander-in-Chief, Middle East, on May 1 with the acting rank of Air Vice-Marshal.

Director of Operational Requirements (A) at the Air Ministry since August, 1958, Air Cdre. Piper was previously on air plans duties at Headquarters, Transport Command. Before going to Transport Command in November, 1955, he commanded R.A.F. Dishforth. Air Cdre. Piper served in the Middle East between 1950-53 when he completed a 2½-year tour in the Canal Zone on air staff planning duties.

New Zealand Canberra O.C.U.

TRAINING courses for R.N.Z.A.F. Canberra aircrews have started at the recently established Bomber Operations Conversion Unit at Ohakea, New Zealand.

Four pilot-navigator crews on the first course will spend four months at the unit training on Canberra T.4s on loan from the R.A.F. before being posted to No. 14 Squadron, R.N.Z.A.F., which will be equipped with Canberra B.12s. Nine B.12s have now been handed over to the Service, leaving two aircraft to be delivered at a later date to complete the order.

A £120,000 works programme is to be undertaken at Ohakea to provide new concrete hardstandings and holding platforms. It will be the first major work on the airfield since 1945 and is designed to meet the requirements of Canberra operations.

Aero-Space Congress

THE R.A.F.'s Consultant in Aviation Physiology and a team of specialists from the Institute of Aviation Medicine, Farnborough, are to attend the 1960 Congress of the American Aero-Space Medical Association at Miami, Florida, next week. A similar team from the Service attended last year's meeting.

Members of the R.A.F. party will present papers at the Congress and the consultant will act as chairman at one of the sessions. Following the Congress there will be a tour which will include visits to the missile base at Cape Canaveral and to the Aero-Space Medical Centre at Brooks Air Force Base. All members of the party will make visits to civil and military scientific establishments in the eastern United States and in Canada.

Cranwell and Henlow Scholarships

NEXT competition for the awards of R.A.F. scholarships under the scheme designed to offer boys opportunities to secure in advance a cadetship in either the General Duties or the Technical branches of the Service will be held in August. Candidates must have reached the age of 15 years and 8 months by the last day of August.

These scholarships provide financial help to parents or guardians towards the cost of the last two years of a boy's education while he is studying to reach the standard needed for a cadetship. Candidates must be able to qualify educationally for entry to the R.A.F. College, Cranwell, or the R.A.F. Technical College, Henlow, before reaching the maximum age for entry. The age limits are: Cranwell, 17½ to 19½ at the date of entry, and Henlow 17 to 19½ on July 1 of the year of entry. There are two entries yearly to Cranwell, in January and September, and one to Henlow, in October.

If a boy is chosen for a cadetship at Cranwell a place is reserved for him there, and if chosen for a technical cadetship a place is held for him at Henlow. He may subsequently be selected for a university course, depending on his showing before the selection board and upon his subsequent academic progress. In either case, the Air Ministry commits itself to take the boy without any further tests provided he remains medically fit and his conduct and progress are satisfactory.

R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

Air Ministry: Gp. Capt. G. N. Blake, M.B.E., and Wg. Cdr. D. L. Harvey to the Department of the Air Member for Supply and Organization.

Fighter Command: Wg. Cdr. J. A. Jarvis, D.F.C., A.F.C., to R.A.F. Sopley to command; Sqn. Ldr. F. Jesson to H.Q., Air Traffic Services, for trials and development duties, with acting rank of Wg. Cdr.; Wg. Cdr. G. V. R. Jones to R.A.F. Coltishall as Senior Technical Officer; Sqn. Ldr. S. J. Eaton, D.F.C., to R.A.F. Waterbeach to command the Flying Wing, with acting rank of Wg. Cdr.

Coastal Command: Wg. Cdr. B. G. T. Stanbridge, M.V.O., A.F.C., to R.A.F. St. Mawgan to command the Flying Wing.

Transport Command: Gp. Capt. J. Wallace, D.S.O., D.F.C., A.F.C., to R.A.F. Benson as Deputy Commander, Queen's Flight; Wg. Cdr. B. J. Jennings, A.F.C., D.F.M., to R.A.F. Odiham to command.

Technical Training Command: Wg. Cdr. R. Hill, O.B.E., to the R.A.F. Technical College, Henlow, for training, plans and progress duties; Sqn. Ldr. N. F. Searle to No. 9 School of Technical Training, Newton, to command, with acting rank of Wg. Cdr.

Maintenance Command: Gp. Capt. P. C. Cleaver, O.B.E., to H.Q. No. 41 Group as Senior Technical Staff Officer.

Far East Air Force: Wg. Cdr. A. R. Wright, D.F.C., A.F.C., to Headquarters for air plans duties; Rev. E. L. P. Evans, to R.A.F. Seletar as Senior Chaplain.

Other Appointments: Wg. Cdr. P. W. Cook to Rangoon as Air Adviser, with acting rank of Gp. Capt.; Wg. Cdr. E. Evans to United Kingdom Services Liaison Staff, Central Africa, as Air Adviser; Wg. Cdr. R. B. Lord, A.F.C., to Copenhagen as Air Attaché; Wg. Cdr. G. B. Johns, D.S.O., D.F.C., A.F.C., to the Ministry of Aviation with acting rank of Gp. Capt.; Wg. Cdr. B. B. Johnson to the United States Air Force for logistics duties, on exchange posting; Rev. W. A. Thomas to H.Q., Allied Air Forces Central Europe.

More Service News

Hucknall Air Display.—The R.A.F. Association Eastern Area Council is organizing an air display at Hucknall Aerodrome on Whit-Monday, June 6. The programme starts at 14.30 hrs.

Runnymede Memorial Service.—The seventh annual Service of Commemoration will be held at the Runnymede Memorial, Egham, next Tuesday, May 10, at 15.15 hrs. This year it is Pakistan's turn to lay the wreath; this will be done by Mr. Sajjad Hyder, the Deputy High Commissioner. The Air Council will be represented by Air Marshal S. C. Elworthy, Deputy Chief of the Air Staff.

New Zealand Air League.—Air Marshal Sir Andrew McKee, former A.O.C.-in-C., Transport Command, has been elected vice-president of the New Zealand branch of the Air League.

No. 256 Squadron Reunion.—The second annual reunion of No. 256 Squadron will be held at the R.A.F. Club, Piccadilly, on Friday, June 10, at 19.00 hrs. Applications for tickets, price 12s. 6d. each, should be made to Flt. Lt. R. D. Bates, Officers' Mess, R.A.F. Bicester, Oxon.

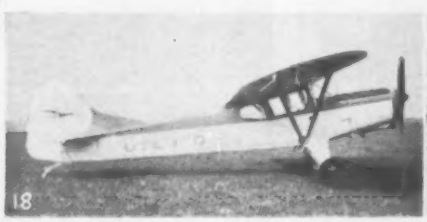
No. 26 Squadron Dinner.—A dinner for all past and present officers of No. 26 Squadron will be held at the Eccleston Hotel, London, S.W.1, on Friday, June 17. Tickets, price 30s. each, can be obtained from Flt. Lt. F. W. Daley, R.A.F. Chivenor, Devon.

AIR-SEA RESCUE.—One of the latest R.A.F. rescue launches operating with a Whirlwind of the Air-Sea rescue service. Similar in design to previous craft, the launch has a number of new features including an aluminium deckhouse and twin 1,450-h.p. Rolls-Royce Sea Griffon engines. Built by Saro (Anglesey) Ltd., it has a range of 680 miles and a maximum speed in excess of 35 knots.

On Show at Kidlington

Some of the newer types of light and executive aircraft which are being shown at Kidlington this week-end through W. S. Shackleton, Ltd., are illustrated on this page. They are listed below, with (where appropriate) their country of origin and U.K. agents. Overleaf begin flight assessments of two of the single-engined types — one American and one British.

1. Piaggio P.166—Italy—(Aero Enterprises (Boreham Wood) Ltd.).
2. Orlican Meta-Sokol—Czechoslovakia—(Gp. Capt. E. L. Mole).
3. Aeromere Falco—Italy—(and F.15 Picchio to be shown).
4. Rhein-Flugzeugbau R.W.3—Germany.
5. D.H. Dove 6—Gt. Britain.
6. Jodel D.140 Mousquetaire — France — (Rollason Aircraft and Engines Ltd.).
7. Beechcraft M.35 Bonanza — U.S.A. — (T. Wayman-Hales, Esq.).



8. Piper Apache—U.S.A.—(Vigors Aviation Ltd.).
9. Piper Comanche—U.S.A.
10. Piper Aztec—U.S.A.
11. Piper Caribbean—U.S.A. —(also Tri-Pacer).
12. Cessna 310D — U.S.A.—(Airwork Services Ltd.).
13. Cessna 210—U.S.A.
14. Cessna 175—U.S.A.
15. Cessna 150—U.S.A.
16. Garland Linnet—Gt. Britain.
17. Rollason Turbulent — Gt. Britain.
18. Auster D.4 (and D.6 to be shown)—Gt. Britain.
19. Lancashire Aircraft Prospector—Gt. Britain.
20. Bellanca 260—U.S.A.

On Show at Kidlington . . . .

Flying the Cessna 175

by John Fricker

IF you can only remember which number identifies what aeroplane, Cessna's remarkable range of single-engined high-wing monoplanes offers a selection of virtues to satisfy almost every taste and requirement between the two-seat utility Model 150, and the de luxe Model 210 four-seater. In the U.K., these span a price range of about £3,500 to nearly £10,000, including the iniquitous 17½% U.K. duty, and their different versions include the 150, 172, 175, Skylark, 180, 182, Skylane and 210.

Except for the largest and smallest of these types they are generally similar, varying mostly with the size of Continental powerplant fitted. The superlative 210 was fully described in our issue of Apr. 15, and the Cessna 172, representing the middle range, on Nov. 6, last year. At the recent sales week-

A high standard of comfort is apparent in the roomy cabin of the Cessna 175, and there is ample instrument and radio space on the deep front panel.

end by Airwork Services, Ltd., the U.K. Cessna agents, at Blackbushe, I was given the opportunity of flying the little Model 150 and the 175, as well as the 210, so gaining representative experience over most of the range.

As I had previously flown the Cessna 172, the slightly more powerful 175 seemed quite familiar on approaching it at Blackbushe for some solo flying. It differs mainly in having a geared GO-300-C flat-six engine developing 175 b.h.p. at 3,200 r.p.m. and driving a larger-diameter McCauley fixed-pitch metal airscrew. The Airwork demonstrator G-APYA is also a 1960 model, with the rakish swept fin and rudder introduced this year, and I was interested to find out if this styling feature had any noticeable effect on handling.

I can report that it apparently did not, but the 175 struck me as being one of the nicest vehicles of its type you could wish to fly. A four-seater, like the 172, it has an additional 30 b.h.p. to provide a pleasantly potent power margin, and its standard of finish and comfort borders on the luxurious. It has a "big-plane" solidity of feel to it which is very reassuring, and its performance is invigorating enough for you really to want to go places.

If I had the necessary £5,326 (U.K. duty paid), I think I would buy a 175 for its looks alone, and there is no doubt

As the author peels-off in the Cessna 175, he displays its shapely all-metal airframe and eye-catching paint scheme. The de luxe Model 175 is named the Skylark and is painted overall.

Photographs copyright "The Aeroplane and Astronautics"

that, with its sleek spats, slick paint finish and glistening metal skin, it has a great deal of eye appeal. If you cannot be bothered to keep its alloy skin shiny, £5,935 will buy you the Skylark version, which is painted all over.

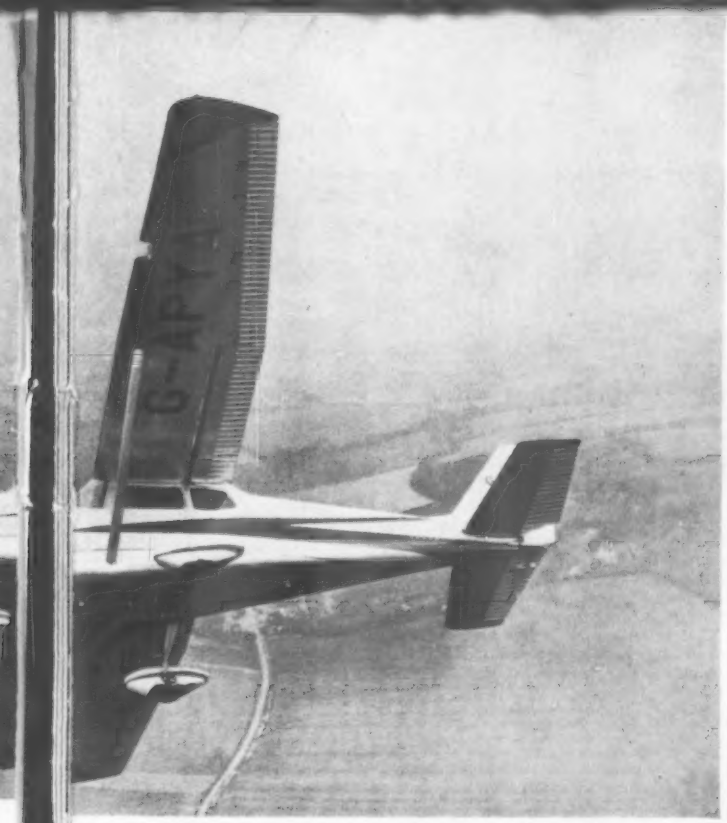
As usual, two big doors give access to the roomy cabin, the two front seats sliding back to assist access. Control location, including flap lever and elevator trim-wheel position, is common throughout the Cessna range, and the 175 has a similarly deep panel of well-laid-out instruments. There is ample panel space to spare for additional instruments and radio to the Narco Simplexer fitted in G-APYA and therefore the fuel gauges for the two 17½-Imp.-gal. wing tanks could be better located than their present rather remote position to starboard.

Although the front seats are still located fairly well aft of the moulded windscreen, outlook from the 175 is less restricted

than in other Cessnas, except for the common blindness in turns. Transparent roof panels would relieve this deficiency, although they would not provide a complete cure. The 175 has the usual roof-mounted loudspeaker, and the engine noise level is completely unobtrusive.

One of the most pleasant features of these American aircraft to a European pilot is the civilized approach which they bring to flying. All aspects of starting can be done from the cockpit, and even the fuel strainers can be drained of water by pulling the appropriate cockpit knob. When taxi-ing, all the Cessna types are very stable on the ground, despite their fuselage-mounted spring-steel undercarriages.

That on the 1960 Model 175 has been shortened by 3½ in. while maintaining an 86-in. track to improve cross-wind stability still further. The shorter nose oleo has allowed the



torque link to be attached directly to the wheel fork, eliminating several parts and saving weight. Because of the shorter landing gear, the engine was raised by 3 in. in the 1960 175, to provide airscrew ground clearance.

It is slightly surprising to find a fixed-pitch propeller on an aircraft as sophisticated as the 175, but an excellent compromise seems to have been made for take-off, climb and cruise performance. Acceleration is lively on opening the plunger-type throttle, with a modicum of right rudder fed in through the steerable nosewheel (10 degrees each side plus a further 30 degrees castoring) to counteract a mild swing.

Unstick is rapid following aft control wheel movement, and the best rate of climb is achieved at 84 m.p.h. I.A.S. About 60 m.p.h. gives the best angle, which is very steep indeed. In the air, the 175 combines positive stability and excellent control characteristics with light and well co-ordinated forces. The elevator is slightly on the heavy side, but this is noticeable only in the changes of longitudinal trim with power and speed. The low-geared trim wheel is so precise, however, that effort can be kept to a minimum.

Cessna's "mighty middle line" must be among the least fatiguing of aircraft to fly, with their low level of noise and vibration, and high standard of comfort. The seat backs are adjustable for angle, and all the types have provision for the Tactair series of pneumatic flight aids. These comprise the T-1, which is a single-axis autopilot operating only on the ailerons; the T-2, which adds a heading lock through the directional gyro; and the T-3, with a further additional servo to the elevators. G-APYA was not fitted with one of these optional aids.

The Cessna 175 can be cruised at anything between 2,400-3,200 r.p.m., although 2,900 r.p.m. is the maximum low-altitude setting. At 5,000 ft. this represents 62% power and will return 129 m.p.h. T.A.S. for a consumption of 7¼ Imp. gal./hr. You can then fly for nearly five hours and cover some 600 miles. Unlike some of its American contemporaries, the 175 has the high never-exceed speed of 176 m.p.h.; its load factors at max. gross are +3.8 and −1.52, both with 150% margins.

On first exploring the low-speed characteristics of the 175, the ceiling was little more than 7-800 ft., but this sufficed for quite an extensive stall evaluation. Clean, power off, strong aft wheel pressure was needed to raise the nose, and although the stall warning horn began bleating at about 50 m.p.h., no breakaway was evident down to 40 m.p.h. I.A.S. A straight sink then develops, the T.A.S. being 60 m.p.h., after adding position error. With full flap and power off, the speed went off the clock, but a straight stall can be achieved, after much hard work and a little elevator buffet, at a T.A.S. of 51 m.p.h.

Once again, the Para-Lift flaps are so powerful that the 30-degree setting would easily suffice for most occasions, but the full 40 degrees gives an exhilarating and easily controlled approach at 65-70 m.p.h. I.A.S. The hold-off is then brief, and the touch-down seems to happen at a brisk walking pace, with an easy squeak of the mainwheel tyres on the runway. You can then lean on the hydraulic toe brakes to stop in a few yards.

CESSNA 175

DIMENSIONS.—Span, 36 ft.; length, 26 ft. 4 in.; height, 8 ft. 8 in.; wing area, 174 sq. ft.

WEIGHTS.—Empty, 1,386 lb.; oil, 19 lb.; four occupants, 680 lb.; baggage, 20 lb.; fuel to gross weight (34 Imp. gal.), 245 lb.; max. gross, 2,350 lb.; (floatplane), 2,450 lb.

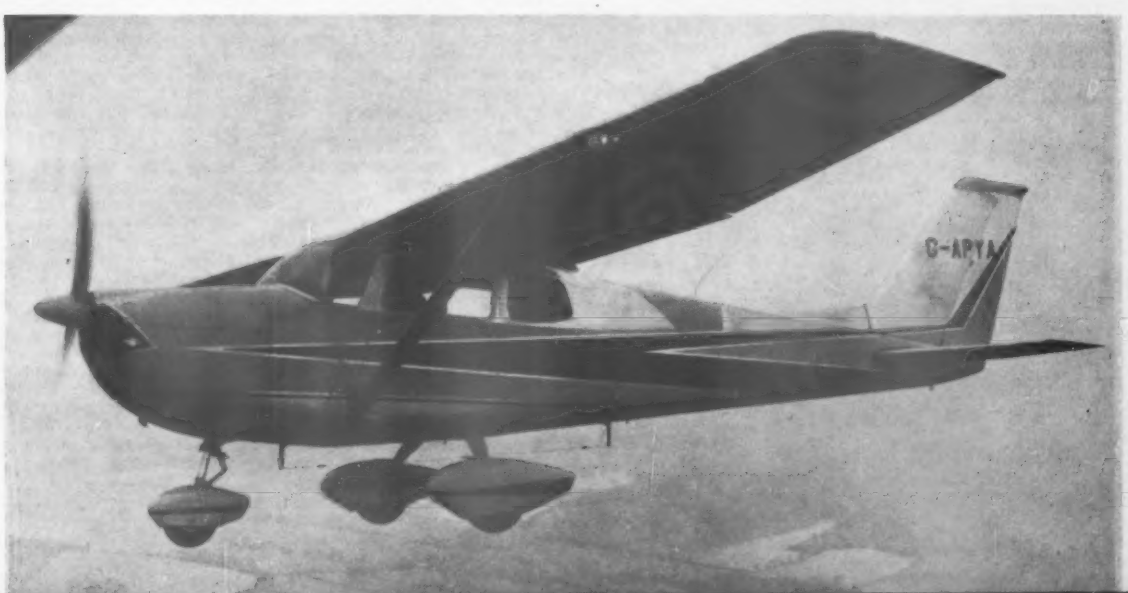
PERFORMANCE.—(Floatplane version in parentheses), max. speed, 147 m.p.h. (113 m.p.h.); max. cruise, at 10,000 ft., 140 m.p.h. (110 m.p.h.); initial climb, 850 ft./min. (775 ft./min.), service ceiling, 15,900 ft. (13,700 ft.); take-off run, 735 ft. (1,525 ft.); to 50 ft., 1,340 ft. (2,350 ft.); landing run, 590 ft. (715 ft.); from 50 ft., 1,155 ft. (1,515 ft.); range at max. cruise, 590 miles (440 miles); max. range at 105 m.p.h. (89 m.p.h.), 755 miles (520 miles), in 7.2 hr. (5.9 hr.).

Flying the 175 in extreme turbulence presented no undue difficulty, and although the "softness" of the ailerons necessitated a certain amount of hard work on the approach, they remained responsive down to the minimum flight speeds. The very positive longitudinal stability and control enabled the selected approach speeds to be accurately maintained and, of course, once down the 175 adhered decisively to the ground.

This is a different sort of flying from that on which most British pilots were brought up, but it is as satisfying in its own way as anything previously encountered. We are going to see a lot of these efficient vehicles for private, club and executive use. As a personal tip to the Cessna company, I would suggest that they might sell many more if they grouped them under different names, instead of rather confusing numbers.

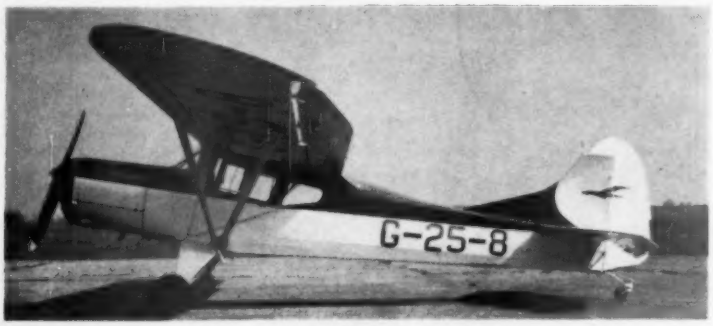
(An assessment of the Cessna 150 will appear shortly.)

The Cessna 175 is fully equipped for night-flying, and has twin landing and taxi-ing lights in the port wing leading-edge. The closely fitting spats are of glass-fibre construction. In these views, the high thrust line of the geared engine is particularly apparent. The trees in the background (left) are at Airwork Service's new base at Booker.



On Show at Kidlington . . . .

Flying the Auster D.4



UNHERALDED by advance publicity, the arrival of the prototype Auster D.4 at the Goodwood meeting on Easter Monday provided a welcome reminder that not all the developments in light aeroplanes come from overseas. As the sole British company which has been continuously engaged in post-war lightplane production, Auster Aircraft, Ltd., has taken advantage of the relaxation of the U.S. import restrictions to revise and modernize its range of products by repowering them with American engines.

At the same time, the opportunity has been taken to modernize the airframes, while retaining most of the well-tried Auster features which have gained them a useful reputation for reliability and economy. Particular attention has been paid to such features as sound-proofing and de luxe comfort, to compete with the transatlantic standards now established in this country, while at prices between £3,000-£4,000 the Auster range also compares very favourably in cost with American types of a corresponding size.

As the smallest of the new range, the D.4 is a two-seater powered by a 108 b.h.p. Lycoming O-235-C1 flat-four engine and, like the rest of the "D" series, it has metal-spar wings and the Workmaster-type tail unit of increased area. The D.5 is a three-seater, corresponding approximately to the former Alpha, and is powered by the 160 b.h.p. Lycoming O-320 flat-four engine, while the D.6 has a similar powerplant in a revised four-seat Autocar airframe. The final basic variant is the D.7, which has a 180 b.h.p. Lycoming O-360-A, and a capacity for four persons each with 50 lb. of baggage.

Austers intend to offer most of these variants with alternative engines and mainplanes of either the 32-ft. Aiglet Trainer type or the 36-ft. longer-span wings of the Autocar or Alpine. Although of similar contours, the new wings will have the former wooden spars replaced by metal units, with butyrate-doped fabric covering. They will also incorporate wing-root fuel tanks as standard, and permit no fewer than 11 practical combinations of airframe and powerplant. These will range from a two-seater with short wings and a 180 b.h.p. engine, cruising at around 150 m.p.h., to a long-winged medium-powered high-capacity type for maximum economy.

An interesting point is that the cowlings and engine mountings will be generally common to all the "D" series, for easy interchange, while basic features among all will also include such items as starters, generators and flaps. Aerodynamic improvements to the airframes include the provision of cuff fairings on the wing struts, and the addition of glass-fibre wheel-spats, while stability is improved by the bigger tail.

The prototype D.4, still registered G-25-8 for its recently concluded Type C. of A. trials, therefore presented little that was new, so far as cockpit familiarization was concerned, when I prepared to fly it at Rearsby. Apart from the sumptuous carpeting and upholstery for the twin side-by-side seats, it conformed to the time-honoured Auster layout.

Additions, so far as the smaller Austers are concerned, are the switches for starter and generator, while a further refinement is the provision of ventilator points on each side of the front screen. View over the flat-topped cowling is quite reasonable, and the high-wing penalty of blind turns is minimized by the roof windows flanking the trim crank.

There is provision for dual control in the D.4, although the starboard stick was not fitted at the time of my flight. The 16-gal. fuel-tank in the starboard wing-root has a floor selector, and may be supplemented for long-range work by a similar tank to port, also with an eye-level gauge. Installation of the second tank brings the gross weight up to 1,900 lb. The Lycoming starts easily from the cockpit and idles smoothly.

Taxi-ing is simplified by the installation of a steerable tail-wheel, augmented if necessary by the usual heel brakes, which are provided only below the port set of rudder pedals. With the standard Auster manual flap lever lowered to its first notch, I found that the D.4 unstuck very rapidly in little more than about 300 ft. in a light wind, and climbed steeply.

At full throttle, 2,600 r.p.m., and 60-65 m.p.h., I timed the climb to 1,000 ft. from the start of take-off at exactly 1½ minutes. A brief cruise check at 2,350 r.p.m. returned about 95 m.p.h., which is similar to the earlier Austers of comparable power. Never-exceed speed is 140 m.p.h.

DIMENSIONS.—Span, 36 ft. (or 32 ft.); length, 23 ft. 4½ in.; height, 8 ft. 1 in.; wing area, 184.5 sq. ft. (164 sq. ft.).

WEIGHTS.—Empty, 1,232 lb.; pilot, passenger, full fuel (single tank) and 50 lb. baggage, 523 lb.; normal gross, 1,755 lb.; max. gross, 1,900 lb.

PERFORMANCE (At 1,755 lb.).—Max. speed, 111 m.p.h.; max. cruise, 98 m.p.h.; economical cruise, 92 m.p.h.; initial climb, 620 ft./min.; absolute ceiling, 16,000 ft.; take-off run, 450 ft.; to 50 ft., 1,200 ft.; range, 250 miles; with two 16 gal. tanks, 500 miles.

First impressions of the D.4 in the air were of the much greater, and welcome, stability conferred by the larger tail unit. Prior to the horn-balanced rudders, the earliest Austers were barely stable directionally, and the addition of the dorsal fin to the bigger rudder has also improved lateral stability. The result is a much more solid "feel" and less tendency to be bounced around in rough air.

The improved ailerons which were first introduced on the Aiglet Trainer, and were later fitted to the long-span wings of the Alpine, will be a feature of the "D" series Austers, although they are not at present installed on the prototype D.4. This nevertheless handled pleasantly throughout its speed range with moderate control forces and low out-of-trim loads.

Not unexpectedly, the D.4 exhibits the well-known Auster docility at the stall which, clean, comes with a gentle break-away and little warning at about 38 m.p.h. I.A.S. With flap and power, a straight nose drop follows a stall nibble at about 30 m.p.h. I.A.S., with very little loss of height, and aileron control remains virtually throughout.

For the approach, the D.4 trims nicely into a steep full flap power-off glide at about 50 m.p.h. or less, and can overshoot with full throttle with only a mild nose-up tendency. There is ample elevator power for the flare-out, but I must confess that I can never guarantee being able to overcome the tendency of the undamped bungee-sprung undercarriage to give back exactly what energy is imparted to it on landing.

The consistent bounce-free three-pointer on grass in an Auster is an art which has so far escaped me, although it becomes easier to achieve in the more heavily loaded variants. From a personal viewpoint, therefore, I regret that Austers have not yet introduced nosewheel undercarriages to their new range. Although a tricycle gear was not a requirement for the first big customer of the "D" series, it would undoubtedly be welcomed by the rapidly more discriminating breed of our private pilots. The combination of qualities offered at highly competitive costs would then be formidable.—JOHN FRICKER.

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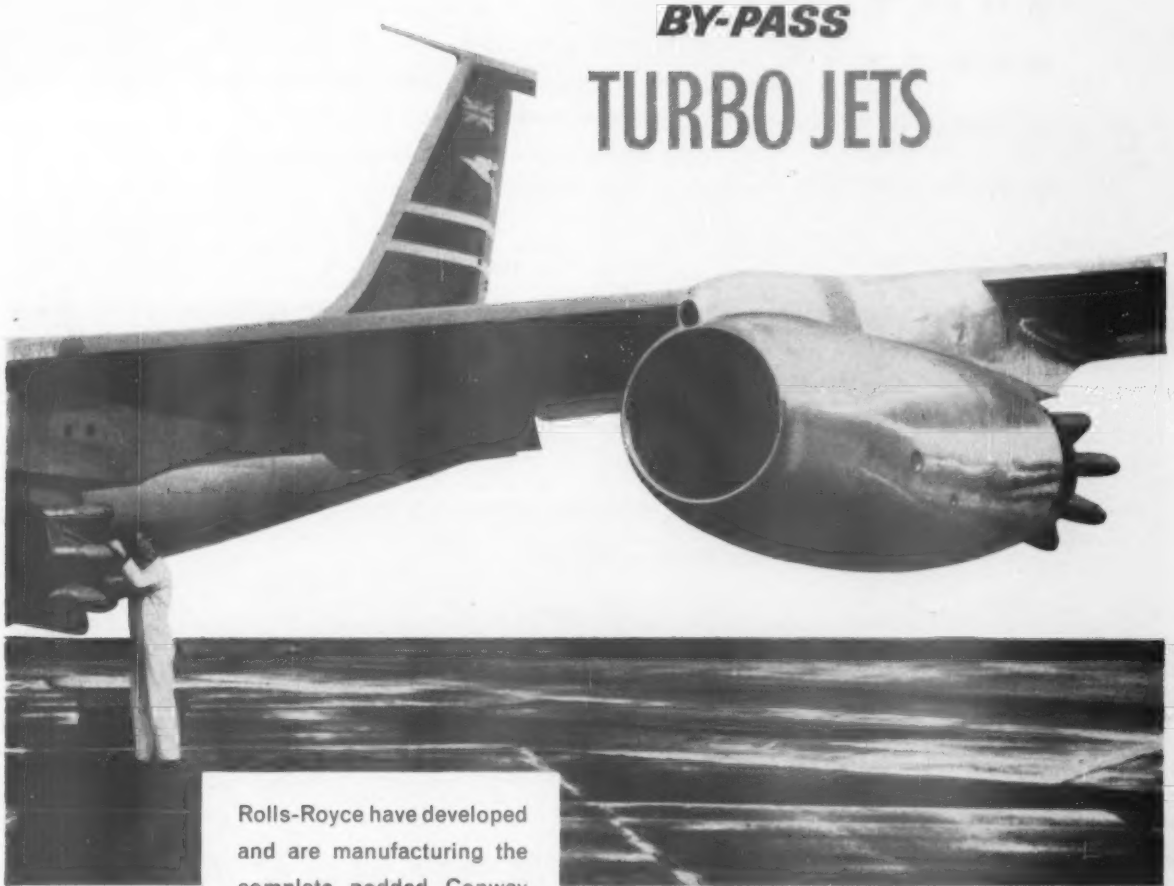

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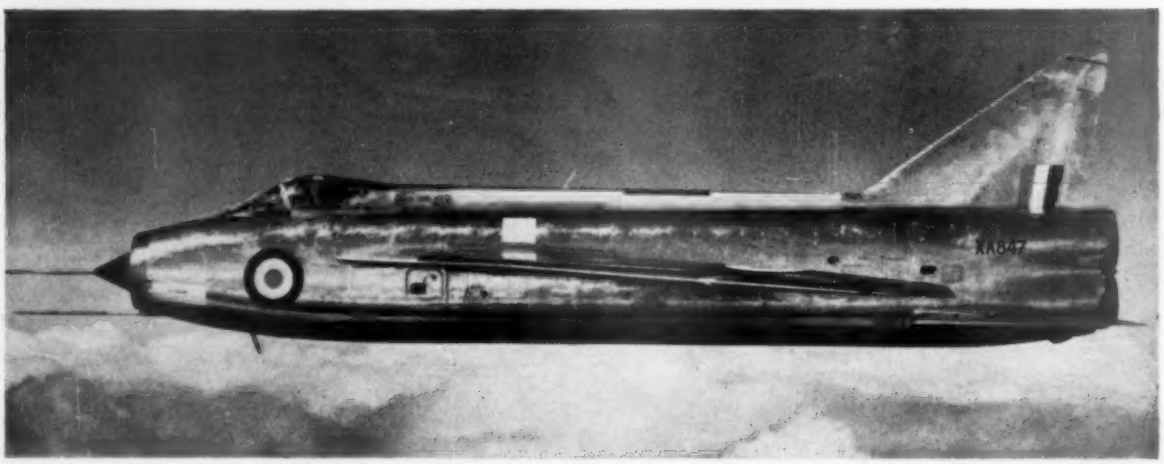

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BOEING-VERTOL PROGRESS

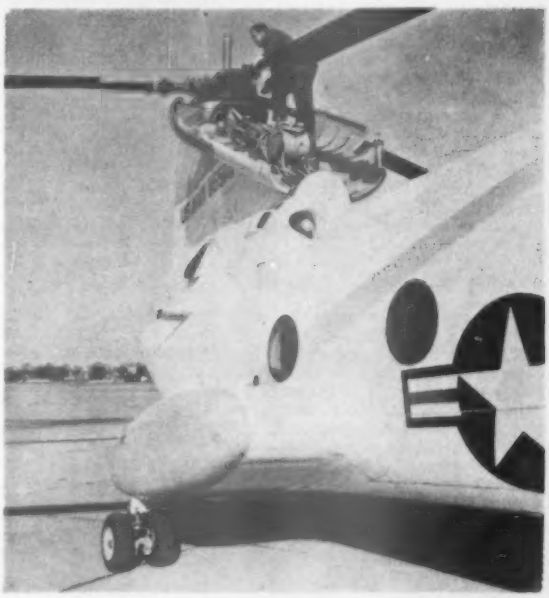
Howard Levy photographs

DEVELOPED from the P.V. Vertol 107, the Boeing-Vertol YHC-1A light tactical helicopter first flew on Aug. 27 last year. Ten of these twin-engined helicopters were originally ordered for evaluation by the U.S. Army, three to be powered by 770-s.h.p. Lycoming T53 turboshafts and seven by 900-s.h.p. General Electric T58-6s. But with development of the doubled-capacity YHC-1B, the contract has been revised. Three YHC-1As are being built, all powered by T58s, but the rest of the effort will go to YHC-1B development.

The YHC-1A has a cruising speed of 145 m.p.h., but has reached speeds up to 172 m.p.h. during evaluation flights. Its mission radius is 100 n.m. with a payload of 3,000 lb.

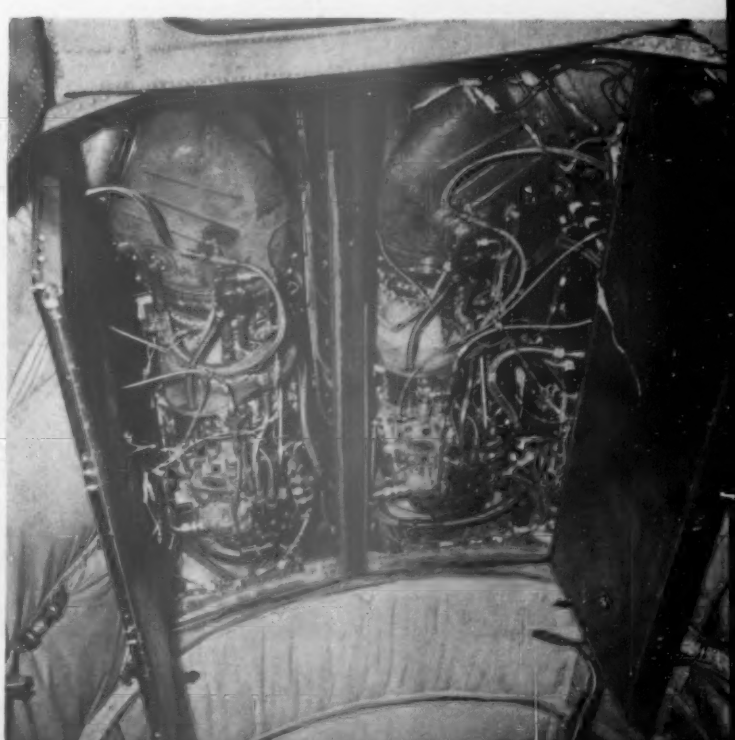
There are numerous changes between the Vertol 107 and the YHC-1A. It has a Vertol-developed stabilization augmentation system which has eliminated the need for a rudder in the rear pylon; the vertical surface now has a cambered trailing edge. The engines have been moved farther forward in the pylon structure and the transmission placed behind them. The aft pylon cowling is now of clamshell type with steps to provide work-stands and give access to hydraulic and oil systems as well as the rear rotor hub and upper controls. The clamshell cowlings on the forward pylon permit access to the forward rotor hub.

The YHC-1A is fitted with a dual nose-wheel. Its main forward cabin door slides up on tracks inside the cabin, stowing along the ceiling and thus leaving the doorway clear for direct truck loading. Although the T58-6 engines have a maximum power of 1,025 s.h.p., the YHC-1A has a 1,700 h.p. "dynamic system" and thus can also accommodate uprated T58-8 engines delivering 1,350 s.h.p.



REAR END.—Above, clamshell doors give access to controls and rotor hub. The stub wings hold the helicopter's 380-gallon fuel load.

UNSYMMETRICAL PYLON.—The trailing edge of the rear pylon is cambered. The cabin can accommodate 26 troops; there is 6 ft. headroom.



ENGINE ACCESS.—Right, the two T58-6 engines are installed at the base of the rear pylon on the YHC-1A. The rear-loading ramp of the helicopter can be raised so that mechanics can reach the engines.

Getting Out into Space

KENNETH W. GATLAND surveys the prospects for a joint Euro-Commonwealth space programme

ONE result of the demise of Blue Streak as a ballistic weapon is that it has forced the Government to consider seriously, for the first time, the whole field of opportunity that exists for astronautics. Previously, there had been a tendency to consider the subject purely in terms of upper atmosphere research with sounding rockets and small instrumented satellites, and the wider implications of space-technology, as applied to such devices as communication satellites, have been neglected.

This situation stems directly from the type of advice the Government has received, notably from the Royal Society whose recommendations were sought in 1958. It was, in fact, a committee of the Royal Society which instituted the development of the Skylark upper atmosphere research rocket which the R.A.E. developed in conjunction with R.P.E., Westcott.

The rôle of the Royal Society, through the medium of the universities, has been to devise experiments and develop instrumentation for various investigations related to the Earth's environment in space. It is this aspect of space-research, and this only, that has received official support to date and for which a maximum expenditure of £200,000 p.a. has been allocated.

This supports the satellite programme which the British National Committee for Space Research has arranged with NASA for the orbiting of British-built instruments, using the Chance Vought Scout. Launchings are expected to begin at Wallops Island towards the end of 1961.

In addition, the Government has initiated design studies at the R.A.E., Farnborough, of possible adaptations of Blue Streak and Black Knight as a satellite launcher. This work has now been in progress almost a year, but again there has been no evidence of any interest beyond the need of university scientists to put heavier payloads into orbit.

These activities seem to have set the pattern for official thought on space-research in this country which has presented something of a barrier to those seeking to encourage a wider astronautical approach.

However, now that the various manufacturers involved in the Blue Streak programme have been invited to estimate the cost of bringing Blue Streak to launching readiness at Woomera as a space-booster, they have also been given the chance of pressing home the many arguments that now exist for a technological programme of space-development.

The great advantage the Blue Streak launching combination offers over the Scout is that it will orbit a payload of 1,750 lb. at 300 miles instead of 150 to 200 lb. available with the much smaller American rocket. Thus, whereas the Scout payload must be spin-stabilized, the British launcher would permit full three-axis stabilization, suitable for a whole range of experiments from the orbiting of astronomical telescopes to active communication and reconnaissance satellites.

In view of the prospects that exist for the communications satellite in relaying telephone and telegraph services, it is natural that this should figure prominently in the industry's recommendations. Apart from its military significance, development of such vehicles as the Courier delayed-action repeater satellite in the United States represents a direct challenge to commercial interests. And if some action on similar lines is not taken on this side of the Atlantic, America —with Russia—may dominate the field of long-distance communications in the next decade.

It is significant that the G.P.O. has recently shown an interest in the communications satellite. This may go a long way towards influencing the Government in the direction of a space-programme.

Although Blue Streak has been discarded as a ballistic missile, its value as a test-vehicle for a whole range of space-experiments should not be underrated. Indeed, in the long-term, there appears to be every justification for continuing its development as part of the defence programme, bearing in mind the many military uses for satellites that are now emerging.

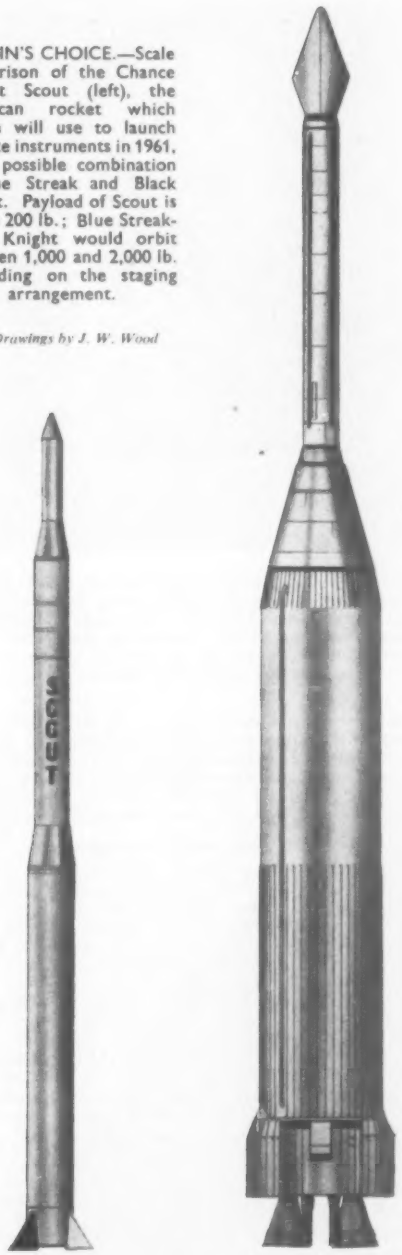
Three-dimensional Defence

The military picture is particularly relevant to the argument. Looking forward to the latter half of the present decade when, according to present plans, the Skybolt ALBM would be operational with R.A.F. Bomber Command, the whole concept of strategic weapons may be expected to have altered radically. It can scarcely be doubted that surveillance, reconnaissance, navigational and communications satellites will be operational, and that the existence of such vehicles will have introduced the need for the anti-orbital missile. In this period, too, we shall probably see boost-gliders of the Dyna-Soar class—or near relations—beginning to supplement the rôle of the mobile ballistic missile.

Indeed, by this time, nuclear weapons may have already begun to move into space in the shape of "jump-down" bombs or hypersonic glide vehicles. In these changed circumstances, the idea of a subsonic bomber flying 500 miles or more to launch its Skybolt ALBMs may not seem particularly attractive. Indeed, as has happened with other weapons, the Americans may already have given it up in the light of other developments.

Even at the present time, it may be noted that there is great interest in tying in the satellite for navigational purposes with the mobile ballistic platform. To ensure launching accuracy of Polaris-equipped submarines, the Americans are looking to the Transit navigational satellite to provide positioning

RADIO STAR.—Demonstration models of the 36-in. dia. 265-lb. Transit IB navigational satellite which successfully entered orbit on Apr. 13. Smaller 50-lb. operational satellites may guide Polaris-equipped nuclear submarines in 1962.



BRITAIN'S CHOICE.—Scale comparison of the Chance Vought Scout (left), the American rocket which Britain will use to launch satellite instruments in 1961, and a possible combination of Blue Streak and Black Knight. Payload of Scout is 150 to 200 lb.; Blue Streak-Black Knight would orbit between 1,000 and 2,000 lb. depending on the staging arrangement.

Drawings by J. W. Wood

information. It is clear, therefore, that the entire defence concept is changing and that the familiar "two-dimensional" view of military operations is rapidly being transformed, with space providing the third dimension.

Blue Streak provides our one opportunity of gaining experience of space-vehicle systems in the years ahead. In this sense, far from being a total loss, the £65 million already committed to its development may be regarded as an investment for the future which we would not otherwise possess.

How much will it cost for us to continue? This is clearly one of the chief preoccupations of de Havilland Propellers and the associated Blue Streak companies, who are expected to report back to the Minister of Aviation shortly. The Minister for Science, Viscount Hailsham, is also involved and has been reviewing recommendations from various sources, including the British Interplanetary Society.

It is unlikely that a worth-while space-programme can be had for less than £30-50 million p.a. in the present circumstances. There is, presumably, a chance that the cost may be shared between certain Commonwealth countries.

If the programme gained partial support from the defence budget, this would be another important factor, while the possibilities of collaborating with our European partners in N.A.T.O. should not be overlooked. This latter solution is being pressed by the B.I.S. It is also reported to have been considered by Mr. Duncan Sandys, Minister of Aviation, in the discussions he has had in Paris and Bonn with French and West German officials.

It is obvious, however, that any arrangements that are made for European collaboration would take a year or more to put into effect and the decision to continue with Blue Streak—and save the vital industrial assets we possess—is for Britain alone.

In costing the project, it is necessary to consider not only the development of the rocket vehicles concerned, the test facilities at Spadeadam in Cumberland, and the relevant launching and tracking facilities at Woomera, but the transportation of the launching vehicles and support equipment from the U.K. to Australia. Without the support of the ballistic programme, this could add up to a tidy sum, despite the fact that a great deal of the necessary facilities will already exist in terms of the £65 million already committed from the defence budget.

Here, it should be emphasized that the sum of £500m. to £600m. mentioned by Mr. Watkinson as being necessary to complete Blue Streak as an operational weapon included the provision of a number of hardened sites in the U.K., which would have accounted for a high proportion of this total. To transform Blue Streak and Black Knight into a satellite launcher would not involve anything like this expenditure.

However, in any satellite programme, provision must be made for receiving and analysing the information that is transmitted from orbit—and, of course, of tracking the satellites over vast areas of the globe. No doubt much assistance could be gained from existing tracking and communications facilities, but others would have to be built for our special needs.

Commonwealth Interest

Foremost among those attempting to promote a technological interest in spaceflight is the British Interplanetary Society which, in the past 12 months, has stepped up its educational campaign by organizing several symposia on various aspects of astronautics. Last year, just before the opening of the 10th I.A.F. Congress in London, the Society ran a very successful Commonwealth Spaceflight Symposium, supported by speakers from Australia, Canada, India and the United Kingdom. Contributions from British industry included papers from the Hawker Siddeley Group, de Havilland Propellers, Pye, Ltd., Normalair, and Bristol-Aerojet.

At the Society's suggestion, the contribution from the Weapons Research Establishment in Australia dealt with Woomera as a space-vehicle tracking and launching station. In that paper, it was made clear that although the present range corridor for rocket firing was angled to the north-west, and thus would involve a payload penalty for satellite launching, there would probably be no insuperable difficulties in firing to the north or north-east. Modification to the range is another factor that must be taken into account in planning a satellite programme.

For the same Symposium, the B.I.S. approached de Havilland Propellers, Ltd., with the view to obtaining a detailed assessment of the possibilities of Blue Streak as a satellite launcher in conjunction with Black Knight. This paper was given by Mr. G. K. C. Pardoe, the project office manager, who gave four examples of possible rocket combinations.

The first was a straightforward adaptation of Blue Streak with a solid-propellent second stage, without any major

TOP STAGE.—Mr. G. K. C. Pardoe, project office manager, de Havilland Propellers, Ltd., holds a model of his proposed adaptation of Black Knight as a top stage for Blue Streak. Note the "doughnut" tank arrangement.

structural change of the main stage booster; the second was a similar adaptation of Blue Streak and Black Knight. In the third scheme, a more compact arrangement of the Black Knight was envisaged using the same Gamma rocket engine with a "doughnut" propellent tank which considerably reduced the vehicle's overall height. One advantage of this was that it enabled the complete vehicle to use the same gantry facilities as the Blue Streak LRBM without modification. The fourth design had the same basic arrangement as the third but with the addition of a solid-propellent third stage.

The de Havilland studies presented by Mr. Pardoe were made independently of the R.A.E., whose findings had led to basically similar conclusions. Deliberations there had produced a range of different configurations, but the one most favoured appears to be based on a modified Blue Streak first stage with a second stage comprising a Black Knight propulsion system, possibly up-rated, but with shorter propellent tanks of increased diameter. In its nose would be a third stage employing low-thrust "vernier" rocket motors utilizing the same propellents as Black Knight, namely H.T.P. and kerosene.

The suggestion here is to operate the low-thrust vernier stage immediately after cut-off of the Black Knight, the vernier motors of 500-1,000 lb. s.t. being lit before termination of second-stage thrust to avoid the necessity for starting under conditions of zero-*g*. After separation, the vernier stage would stabilize along the local horizon and rise to orbital height under continuous low thrust.

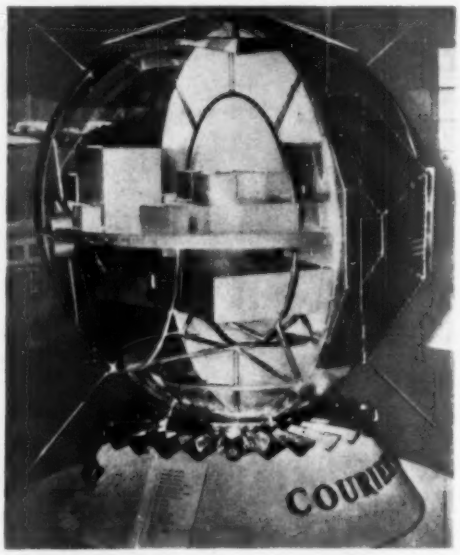
In this way, the terminal stage would be under continuous propulsion for perhaps as long as 20 to 30 minutes. This would allow ample time for ground corrections right up to the time of final cut-off at the injection velocity.

In developing this technique, use could no doubt be made of experience already acquired with the small Bristol Siddeley PR.23 rocket motor of 500 lb. s.t. which has been developed to fulfil a need for a very small liquid propellent engine. As presently conceived, the engine is a self-contained variable-thrust unit weighing only 32 lb. Burning kerosene and H.T.P., it has a high specific impulse and, according to the manufacturer, the thrust can be smoothly controlled down to at least one-third of the maximum with only slight reduction in S.I.

Calculations indicate that a three-stage launching vehicle of the type proposed by the R.A.E. could establish a payload of 1,750 lb. in a circular orbit at 300 miles. Alternatively, it could send a payload of 400-500 lb. into an eccentric orbit with a perigee of 300 miles and an apogee of 8,000 miles.

It can be seen that there exists in British rocketry a very considerable scope for developing a useful satellite programme. There is particular enthusiasm for the communications satellite among such companies as Hawker Siddeley and Pye, Ltd., for which the proposed adaptation of Blue Streak and Black Knight would provide a wide range of opportunity.

The payload capability of the Blue Streak combination would also permit satellites to be developed for purposes of surveillance, reconnaissance, meteorology, and navigation. An extensive "Orientation Report on Astronautics," prepared by the A.T.S. Company, a member of the Hawker Siddeley Group, mentioning these and other military and civil applications, was reviewed in THE AEROPLANE AND ASTRONAUTICS on Apr. 22. Moreover, Sir W. G. Armstrong Whitworth Aircraft, Ltd., have had a small study group working on a manned boost-glider for the past three years; it has been said that a half-scale model could be launched by a Blue Streak-Black Knight combination.



GLOBAL LINK.—Sectional model of the 500-lb. Courier delayed-action repeater satellite, being developed by the U.S. Army Signal Corps as a first step in establishing global communications. Containing five special tape recorders, it is designed to provide 20 continuously available 100 word/min. teleprint channels.

"Third Force" in Space

One thing seems fairly certain. We shall need the ability to launch space-vehicles by the end of the present decade to allow our technology to expand into such fields as communications satellites and certain aspects of defence. If the industrial structure which at present surrounds the Blue Streak is broken down, it will take a long time to re-build, and the re-building will cost us far more than £65 million.

Nevertheless, it is doubtful if we can afford to proceed alone. In Commonwealth-European co-operation, however, we have the opportunity of providing a useful "third force" in space which could not avoid strengthening the scientific and economic ties between the participating nations. In this, Britain would have a key part to play because we possess the only suitable rocket vehicles outside Russia and the United States.

Three Days in a Pressure Suit

A FLIGHT SURGEON, 36 years old, has come successfully through an experiment in which he spent 76¼ hours in a pressure suit breathing 100% oxygen at reduced pressure, mostly at the equivalent of 35,000 ft. The worst that happened to him, according to Cdr. A. L. Hall and R. J. Martin, of the United States Navy, who report the experiment in *Aerospace Medicine*, was some cramp in the legs after 67 hours and a rash on parts of the trunk attributed to "insanitary skin conditions inherent in the experiment." There were also some pressure points over bony prominences, and the dryness of the oxygen caused mild irritation of his eyes and slightly affected his nose, throat and lungs—evidently something needs to be done about supplying added moisture.

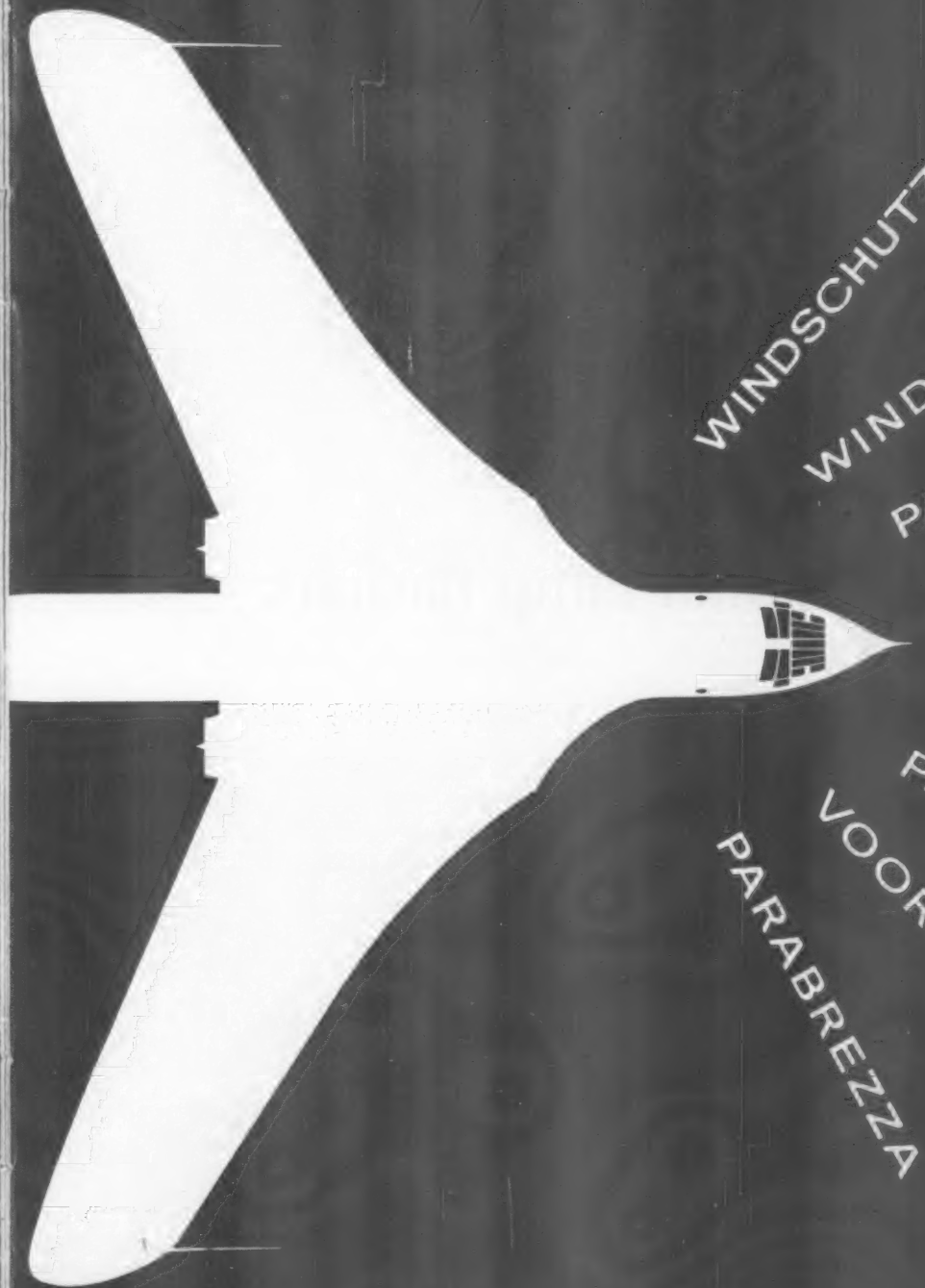
The pressure suit, a Navy Mark III, Mod II, caused certain inconveniences. The exhalation valve was hard to blow open when the pressure in the test chamber was no lower than that in the suit. When the outside pressure was reduced to the equivalent of 140,000 ft., the "subject" could move his arms, hands and head freely, but fine finger movements were restricted. He found the noise of the suit controller when on high ventilation annoying.

There were two main objects of the experiment: first, to see how long, in case of the cabin being holed by a meteorite, a space traveller could survive in a pressure suit while repairing and re-pressurizing the cabin; and secondly, to see whether a cabin atmosphere of 100% oxygen at a pressure equivalent to 35,000 ft. (3.45 lb./sq. in. or 178.6 mm. of mercury) would be tolerable for a long space voyage, as it would save much structure weight if the cabin need only be stressed for that pressure.—A.E.S.

Jets, But Not Solar

WHEN Yngve Oehman, of the Stockholm Observatory, saw "a rapidly moving 'dark' surge-like object which when crossing the solar limb appeared as a bright 'surge,' visible during about two seconds and with a maximum extension of about two minutes of arc," he had a cable sent out from the IGY warning centre in Stockholm, only to find that no other astronomer had seen the Sun behaving in this remarkable manner. But when, later, his colleague Mr. I. Furenlid saw the same thing happen again, they both suspected that it was a refraction effect caused by jet aeroplanes stirring up the air as they crossed the Sun's disc.

So, according to a letter published in *The Observatory*, the Swedish Air Force wing in Gothenburg obliged by flying jet planes between Stockholm Observatory and the Sun, at a distance of about six miles from the observatory, and, sure enough, on two occasions "the entry at the limb was observed in the telescope and twin prominences were in both cases clearly seen during somewhat more than one second and with a brightness similar to that of the solar disc."—A.E.S.



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Hard-landing Moon-probe

A 300-LB. instrument package capable of surviving impact with the Moon has been ordered by the National Aeronautics and Space Administration. It will be developed by the Aeronutronic Division of the Ford Motor Company and will cost about £1,286,000.

The intention is to carry this probe package on the back of a larger space-vehicle already being built at NASA's Jet Propulsion Laboratory in Pasadena, California.

At a distance of about 20 to 25 miles from the surface of the Moon, the mushroom-shaped instrument package will be detached and a retro-rocket will reduce its speed at impact to less than 300 m.p.h. The parent vehicle will be destroyed as it falls on the Moon unchecked at a speed of more than 5,000 m.p.h.

The 300-lb. instrument package, containing a seismometer, temperature-recording devices and other instruments, will be protected by a honeycomb crushable structure designed to absorb impact. After crash landing, it is expected that the instruments will transmit data back to Earth for a month or more.

Together, the main structure of the space-vehicle and the 300-lb. capsule weigh about 800 lb. They will be launched by an Atlas-Agena B and will take 60 to 70 hours to reach the Moon. It is proposed to embody a television camera in the larger vehicle for photographing the Moon at close quarters right up to the moment of impact. Research instruments will also be carried.

The purpose of carrying the seismometer in the 300-lb. package is to learn something of the Moon's interior by the way in which pressure waves, which may result from meteor impact on disturbances in the crust, travel through the sub-strata.

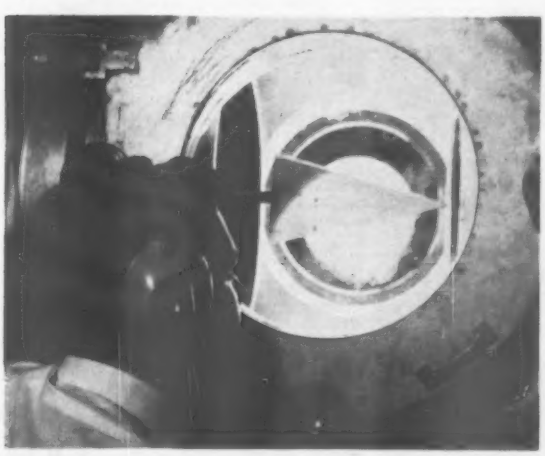
Saturn's Second Stage

THE Douglas Aircraft Company has been selected by NASA as the manufacturer of the S-4 high-energy second stage for the three-stage Saturn booster. Estimated cost of development and production of nine second stages, including two spares, will be about £23 million.

A cluster of four Centaur-class lox-hydrogen engines developing a total of about 80,000 lb. s.t. will be used. They will be supplied under separate contract by the Pratt & Whitney Division of the United Aircraft Corporation.

Douglas propose building the second stage at their Santa Monica division in California, and to transport it by barge to a test site near Sacramento for static firing. It will then be shipped east through the Panama Canal.

The prototype stage will be delivered by sea to NASA's Marshall Space Flight Center at Huntsville, Alabama, for mating with the eight-engine Saturn first stage, where this vehicle is being constructed. Both stages will then be taken by barge to Cape Canaveral. Eventually, it is proposed to ship the S-4 stages direct to Canaveral.



The U.S.A.F. have announced an order for 11 Dyna-Soar boost gliders. Here an early test configuration is observed in a Boeing wind-tunnel.

Diagram illustrating the proposed NASA technique for launching a double probe package to the Moon using Atlas-Agena B.

Rockets and Space Flight

A SURVEY lecture covering the field of "Rocket Propulsion for Atmosphere and Space Flight," was given before the Wolverhampton and District Engineering Society on January 6 by Mr. E. G. P. Andrews, chief designer, Rocket Division, Bristol Siddeley Engines, Ltd. Beginning with a discussion of rocket performance, Mr. Andrews dealt in some detail with the development in the U.K. of the HTP/kerosene rocket engine, and in particular with the Bristol Siddeley Gamma Mk. 201, used with such outstanding success in the Saunders-Roe Black Knight.

Order for Dyna-Soar

AFTER months of uncertainty over the final design configuration, an order has now been placed by the U.S.A.F. with the Boeing Airplane Company for the development and construction of 11 Dyna-Soar boost-gliders. These are expected to have the shape of a narrow-delta. Three will be used for ground testing, four for unmanned test flights and four for manned test flights. The project is expected to cost £170 million during the first three years, £10,607,000 of which will be for design and ground testing.

First test vehicles will be launched by modified Titan ICBMs. A larger booster, possibly a version of Centaur or Saturn, will be used in later tests to reach orbital speeds. According to the U.S.A.F., manned flights will be made from Cape Canaveral and after circling the Earth in less than 90 minutes, the vehicle will be brought back to a landing, under pilot-control, on the Californian desert.

However, before this stage is reached, a long series of preliminary tests is envisaged. First step will be to develop and test a hypersonic vehicle which can extend its range by aerodynamic means (unlike the Mercury space-capsule which pursues a purely ballistic path). Here, experience now being gained in experimental flights with the North American X-15 will be valuable. If the programme continues as planned, a Dyna-Soar glide-vehicle may be launched, unpowered but manned, from a B-52 parent aircraft at Edwards Air Force Base, California, in late 1962. First sub-orbital flight is not expected before September, 1964.

As a necessary part of the development programme, unmanned gliders, and later, manned gliders, will be launched downrange from Cape Canaveral to explore the problems of flight at speeds up to 15,000 m.p.h.

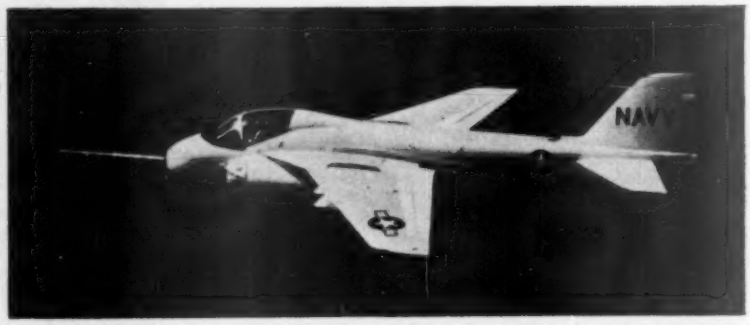
Unofficial reports have suggested that the first rocket-launched Dyna-Soar will weigh about 7,000 lb. (empty weight of the X-15 is about 13,000 lb.). This may be followed by a manned vehicle about 30% larger having a launch weight of between 15,000 and 20,000 lb.

The current project dates from June, 1958, when Boeing and the Martin Company were awarded competitive first-phase development contracts. In November last year, the U.S.A.F. announced that Boeing would be responsible for the manufacture of the glide vehicle and under the direction of the Wright Air Development Division, would be responsible for the integration of vehicle sub-systems, integration of the vehicle with the booster, and assembly and test. The Martin Company would manufacture the boost portion of the system.

With Air Force guidance and subject to U.S.A.F. approval, Boeing will select major sub-systems and components on a competitive basis as they are required in the programme.

Aviation News in General

ALL-WEATHER ATTACK. — A new U.S. Navy carrier-based low-level attack bomber, the Grumman A2F-1 Intruder, was unveiled last week. Powered by two 8,500-lb. thrust J52-P-6 Pratt & Whitney turbojets, it has an "integrated display system" for providing visual representation of the target area in all-weather operations and a digital integrated attack navigation system. A subsonic aircraft, it has a two-man (pilot and radar operator) crew.



NEW TYPE.—The Grumman A2F-1 Intruder long-range low-level attack bomber for the U.S. Navy. The jetpipes of the two J52-P-6 Pratt & Whitney turbojets are hydraulically actuated so that they can be tilted downwards for providing additional lift during carrier launching.

PIAGGIO VIPERS.—Bristol Siddeley Engines, Ltd., has signed a licence agreement with Piaggio for the manufacture and sale in Italy of the Viper 11 turbojet. This 2,500-lb.-thrust engine powers the Macchi MB 326 which has been adopted by the Italian Air Force as its standard primary trainer.

DOUGLAS LOSSES.—In the first quarter of 1960, Douglas Aircraft Co. recorded a net loss of $6,949,000, following an $8,117,000 loss in the previous quarter. The DC-8 accounted for most of the loss: costs had been expected to fall below price after about the 20th DC-8 built but this point is not now likely to be reached until 70 aircraft have been built. A 5% increase in the price of all DC-8s ordered after Jne. 1 has been announced by the company.

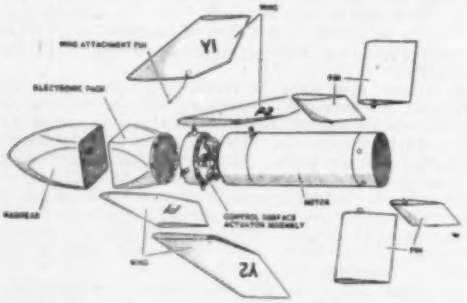
SUPER-CONVAIR APPROVED.—The Allison-powered Super-Convair has been certificated by the F.A.A., only four months after the first flight. F.A.A. tests began on Feb. 18 and were conducted on the first two conversions.

A.T.C. EXPERIMENT.—The design and development of a semi-automatic air traffic en-route control system using current military SAGE facilities will be undertaken by the Mitre Corp. under a $6 million contract awarded by the F.A.A. A live test of SAGE as a means of improving high-altitude air traffic control services is at present being conducted as part of the joint F.A.A./U.S.A.F. Trailsmoke project.

BLIND LANDING AID.—Lear Inc. is developing an airborne flight-control system for automatic landings under an F.A.A. contract. The system includes a computer which receives signals from a ground transmitter and commands a modified L-5 autopilot. Flight tests will begin in July.

NUCLEAR FALCON.—A version of the Hughes Falcon air-to-air missile with a nuclear warhead is being evaluated by the U.S.A.F. and is expected to enter service later this year. It is reported to be 7 ft. long, 11 in. in diameter and to weigh just over 200 lb.

SKY HIGH.—An Aerobee-Hi research rocket was fired from Wallops Island, Virginia, on Apr. 26 as part of a series of experiments in rocket-astronomy by NASA's Goddard Space Flight Center. With a burning time of 52 sec., the rocket reached an altitude of about 130 miles and fell into the Atlantic.



GERMAN SEACATS.—As mentioned on this page, the Short Seacat naval SAM may be adopted by Germany. This diagram from the company shows the principal components.

FOCKE-WULF SEACATS? — Short Bros. and Harland, Ltd., have announced an agreement with Focke-Wulf under which their Seacat naval SAM will be evaluated by the German armed forces. Focke-Wulf will support the test programme and joint development of this short-range missile is envisaged if it proves suitable for Germany. Principal components of the missile are shown below. It is 58 in. long. Wing span is 26 in. and body diameter 7.5 in.

RED ROCKETS.—A number of tactical rocket missiles was included in the Moscow May Day Parade through Red Square. A giant 400-mm. atomic cannon and four 305-mm. guns capable of firing atomic shells were also seen.

SPACE PILOT. — The Transit 1B navigational satellite is being tracked at sea by the missile test ship, U.S.S. "Observation Island." Doppler shift of the radio signals is plotted but as the satellite does not contain memory units capable of storing orbital data, the ship cannot actually navigate by this means.

FIRST SCOUT.—First firing of a Scout test-vehicle at Wallops Island, Virginia, in April, was a partial failure because the third stage did not ignite. The 72-ft., 35,000-lb. test-vehicle carried a dummy second stage and a weighted nose cap to simulate the fourth stage. Scout is expected to orbit British-built instruments in 1961.

Commercial Aviation Affairs

ANOTHER F-27.—Ansett-A.N.A. has ordered one more F-27 from Fokker, bringing the total sold to 73.

SUPERSONIC STUDY.—IATA will include a special discussion of supersonic transports in its 1961 Technical Conference to be held in North America in mid-May. A special advisory group is at present constituting a draft agenda and listing questions which the airlines want answered. Announcing the meeting, IATA's technical director said: "The object . . . is to make certain that if we do go to supersonic aircraft, we will get what we really need, and not what manufacturers may have to sell."

T.W.A. FINANCE.—Howard Hughes has announced plans to raise $340 million to finance the T.W.A. jet fleet. Up to $190 million will be sought from institutional lenders and T.W.A. will offer its stockholders $100 million of debentures, while Mr. Hughes himself will lend T.W.A. up to $50 million. T.W.A. at present leases 15 Boeing 707-131s and five 707-331s from Hughes Tool Co. and will be putting more 707-331s and a fleet of Convair 880s into service this year.

WESTERN 707s.—Western Air Lines will start operating Boeing 707-120s on its routes along the U.S. West Coast between Los Angeles and Seattle on Jne 1. Western (and not Braniff, as we indicated last week) has leased from Boeing two 707s built originally for Cubana.

AIR CEYLON ELECTRA.—Electras are expected to replace Constellations on Air Ceylon's route from Colombo to Amsterdam in October. Like the Constellations, the Electras will be chartered from K.L.M.

CAR AMBULANCE.—By arrangement with Channel Air Bridge the Automobile Association will this year fly back to this country the cars and motorcycles of its members which break down and are beyond local repair when abroad. Last year more than 1,000 vehicles were returned from the Continent by sea under this A.A. scheme.

ASSOCIATE AGREEMENTS.—The agreement between B.E.A. and Skyways on the London-Malta route is effective for three years from Apr. 19. The low night fare of £33 13s. return is now offered by both airlines. B.E.A. uses Viscounts and Comets and Skyways operates Constellations via Tunis. As already announced the B.E.A.-British United Airways agreement on the London-Gibraltar route is for 10 years from Apr. 28.

COPENHAGEN IMPROVED.—The new terminal building, apron and extended runway at Copenhagen Airport came into operation on Apr. 30. The main runway has been extended to 10,000 ft. and a hydrant fuelling system has been installed linking the 24-stand apron with a 1,500,000-gallon fuel depot three miles away.

LOCAL SERVICE GROWTH. — According to the A.T.A., the 13 local service airlines in the U.S. carried 22% more passengers in 1959 and flew 25% more revenue passenger miles. Freight and express ton-miles rose by 32%. Service was inaugurated at 48 new points during the year raising the total to 564, and the unduplicated route mileage was increased by 28%. About 300 aircraft are used by these airlines, which still operate with a Government subsidy.

AWARDS FOR WOMEN.—Last week Lord Brabazon of Tara presented the Jean Lennox Bird Trophy to Mrs. Ann Burns (left) in recognition of her record-breaking flight in a glider on May 10, 1959. At the same presentation, Mrs. Yvonne Pope (right) received the Brabazon Cup for her work as an instructor at Exeter Airport.

VENEZUELAN CRASH.—A DC-3 operated by L.A.V. crashed near Calabozo while on a flight from Caracas to Ayacucho on Apr. 28, killing nine passengers and the pilot. Two passengers and the co-pilot survived; reports state that a hand-grenade exploded on board.

B.W.I.A. INAUGURAL.—On Apr. 29, B.W.I.A. inaugurated transatlantic service between Trinidad, Barbados, New York and London. B.O.A.C. Britannias (and crews) are used in B.W.I.A. livery.

HAMBLE TO PERTH.—Nearly 80 aviation engineering students who have been studying at the former Air Service Training college at Hamble moved to the Airwork Services Training School at Perth on Apr. 29. They will continue their studies under the same instructors.

B.E.A. TRAINING CENTRE. — A £500,000 contract has been placed by B.E.A. for construction of a training centre at Heston, adjacent to the Flight Simulator Unit. To be completed in September, 1961, the training college will have a floor area of 85,000 sq. ft. and will include an eight-storey hostel.

DUBLIN TERMINAL.—On Apr. 25, the B.K.S. vehicle ferry service between Dublin and Liverpool was inaugurated. A special car ferry terminal has been built at Dublin Airport to handle the traffic, which is expected to amount to 2,400 cars and 7,500 passengers by the end of September.

NEW SERVICE.—The M.o.A. has approved the operation of a scheduled service by East Anglian Flying Services, Ltd., on the route Ipswich-Southend-Rochester-Shoreham-Paris for two years. A B.E.A. application to operate a service on the route London-Dusseldorf and for Cologne and for Berlin has also been approved.

News About People

R.Ae.C. CHANGES.—Mr. Maurice Imray, R.Ae.C. aviation secretary since 1957, has resigned to take up an appointment with Mr. Nat Somers in the development of Panshanger Aerodrome. Mr. Imray is succeeded as aviation secretary by Sqn. Ldr. R. R. Stephenson, D.F.C., who joined the staff of the Club in February, 1958.

D.H. AUSTRALIA APPOINTMENTS.—Mr. Lester Bain has resigned his appointment as managing director of D.H. Aircraft Australia Pty. Maj. Hereward de Havilland has joined the board and becomes deputy chairman. Mr. D. H. McLachlan, previously general manager, is appointed financial director; Mr. Rollo Kingsford - Smith the commercial manager, becomes director and general manager of the aircraft division; and Mr. G. I. A. Spittle becomes director and general manager of the general engineering division.

C.A.B. CHAIRMAN. — President Eisenhower has named Whitney Gillilland to be chairman of the Civil Aeronautics Board in succession to Mr. James Durfee. A lawyer, Mr. Gillilland was chairman of the U.S. Foreign Claims Settlement Commission before joining the C.A.B. last November.

COMING TO EUROPE.—Mr. Ed. H. Heinemann, who is well known as chief engineer of the Douglas El Segundo plant, has been appointed to head the company's European Division in succession to Mr. M. E. Oliveau who is returning to the head office. Mr. A. E. Raymond is retiring as senior vice-president, engineering, and will be succeeded by Mr. Edward F. Burton.

EUROPEAN REPRESENTATIVE.—Mr. Douglas Edwards has been appointed technical sales manager, Europe, by the A. V. Roe Canada aeronautical group of companies. He will be based in Bonn where he was formerly the R.C.A.F. air attaché. Mr. Edwards will represent Avro Aircraft, Ltd., Orenda Engines, Ltd., Canadian Applied Research, Ltd., and Canadian Steel Improvement, Ltd.

JERSEY FLIGHT CHANGE.—Capt. Edward W. Jordan, O.B.E., manager of the B.E.A. Jersey Flight since 1948, retired on May 1. He learnt to fly with the R.F.C. and began free-lance flying and "barnstorming" with an Avro 504 in 1922. He joined Jersey Airlines in 1935, served with the A.T.A. and the North Atlantic Ferry Service during the War and then joined Channel Island Airways before transferring to B.E.A. in 1947. He is succeeded by Capt. Charles E. S. Riley, A.F.C., Pionair flight manager since May, 1957. Capt. Riley entered the airline business in 1934 with Imperial Airways and joined B.E.A. in 1946.

McKEE TROPHY.—Mr. J. A. D. McCurdy has been awarded the Trans-Canada (McKee) Trophy for 1959 in recognition of his services in the cause of Canadian aviation during the past 50 years.

WEYBRIDGE APPRENTICES.—This year Lord Nelson of Stafford, chairman of The English Electric Co., presented the awards at the annual Vickers-Armstrongs (Aircraft) Ltd., apprentice Speech Day. Special award winners were, left to right, M. Harman, J. Stillman, P. Drew, J. G. Hicks, B. E. Cage and C. J. Speake.

Personal Flying

THE imports of American aircraft into this country are now beginning to build up in a really substantial way, despite the frequent denials in the past, by some pessimists, of the existence of a worth-while market. In the latest British Register, Piper products show a clear lead in sales, under the vigorous impulse of Vigors Aviation and other aircraft sales agents, and the current score comprises no fewer than 18 Tri-Pacers or Caribbeans, nine Cubs of various sorts, six Comanches and six Apaches. The first Aztec is expected in time for the Kidlington week-end, and a Pawnee is scheduled to arrive fairly soon.

Cessna sales are beginning to mount, through Airwork Services, Ltd., and the used aircraft dealers, and at the moment there are something like four Model 310s and two 172s, as well as single examples of the 150, 170, 175 and 180. A Cessna 310D is being flown across the Atlantic to arrive, it is hoped, for the Kidlington week-end, and other examples of the Cessna single-engined range may be expected in the near future.

The remaining American light aeroplane manufacturers, including Beech, the Helio Corporation, Mooney and so on, are represented in small numbers on the British Register at the moment, but an increase in their numbers is inevitable. One of the aircraft of considerable interest at Kidlington tomorrow is likely to be a Bellanca 260. This is at present registered in Eire but is available in this country. It is a high-performance four-seater covered with a glass-fibre skin.

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A regrettable omission from the Shackleton sales week-end will be the PZL contingent from Poland. We hear from the U.K. agents, Norco Engineering, Ltd., that the authorities in Warsaw were unable to complete the arrangements in time for the aircraft to reach Kidlington.

The visit of the PZL-102B all-metal two-seater is still planned, however, to take place towards the end of May.

ELSTREE VIC.—Three of the five Chipmunks of the London School of Flying at Elstree are seen here in formation, flown by John Schooling, the C.F.I., Stuart Craft and Miss Janet Ferguson.

• • •

The first parachute club in Scotland has been formed at Airwork Services' airfield at Perth, on the initiative of Dr. C. Robertson, a former member of Glasgow University Air Squadron. During his National Service as an R.A.F. M.O., he qualified as a parachutist at No. 1 P.T.S., and to continue with the sport, he approached Wg. Cdr. F. D. Nugent of Airwork at Perth.

This is the base of the Scottish Aero Club, which is being affiliated with the Scottish Parachute Club, to provide mutual membership. Initial equipment comprises four Irving parachutes, and the first course is planned, with the voluntary aid of two R.A.F. instructors, to start on Jne. 4. Dr. Robertson and Mr. J. Taylor, who is an experienced T.A. parachutist, jumped at Perth from 2,000 ft. on Apr. 10.

Gliding Notes

by Dr. A. E. Slater

EASTER brought cross-country weather to many clubs. At the London Club on Easter Monday, John Jeffries set out on a large triangle, but somewhere beyond Lasham he changed his mind and tried for Roborough (Plymouth), but finished up at Bridport on the Dorset coast—or more precisely, on the side of an extremely steep hill, where his glider remained poised till midnight. Geoffrey Stephenson made a first test flight with his new Skylark 3C and succeeded in reaching an altitude of 10,000 ft.

Monday's task at Dunstable, an out-and-return to Duxford and back, was completed by Roger Mann, who had moved on after winning the first task in the Lasham Rally. John Jeffries, back from Dorset by midday, was then seen setting off in the opposite direction to Duxford but somehow reached the East Coast; from there his navigation took him to within sight of London, whereupon he turned right for Dunstable. Was this a triangle?

On the following Thursday, Apr. 21, two Silver C flights were made from Dunstable to Lasham, and Colin Richardson made an out-and-return of 162 miles to Cranwell and back, taking 6½ hours. He saw very few clouds, and those he did see were tiny bits of cumulus at the very tops of the thermals. Since they vanished as soon as the underlying thermal stopped, he could be sure of finding lift under every one; larger sized cumulus have an annoying habit of living on after the thermal below them has stopped.

Another flight this day was by Peter Scott from Swanton Morley in Norfolk to Exeter; a report of his "emergency landing" there earned the headline "Birdman's dive" in the *News Chronicle*. This distance, 235 miles, was about 20 miles longer than his Nympsfield—Camphill—Gloucester flight of four days before. To make 500 km. (311 miles) he would have had to reach Falmouth.

Another Nympsfield flight was a climb by Tony Gaze to 9,000 ft. on the Thursday before Easter. He will be Australia's representative at the World Championships.

From the Derbyshire and Lancashire Club at Camphill, three people set off on Easter Sunday in the direction of the Long Mynd. Bob Frodsham got nearest in an Olympia with 69 miles to Old Stretton; Martin Hallbrook in the Avro Club's Skylark 2 made 61 miles to Condover, 11 miles to the N.N.E.; and Roy Illidge 62 miles to Redditch, 30 mues E.S.E. of the Mynd, in a Gull 4. Michael Kaye and John Taylor took the Eagle round a triangle via Hucknall and Burnaston, but finished 3 miles short.

• • •

From the Oxford Club Anita Schmitt made flights in her Grunau Baby to Netheravon and Great Dunmow; and a pupil on his fourth solo took the Sedbergh to 4,000 ft. And from Newcastle Club at Usworth on the Saturday Douglas Collinson flew 112 miles to Gainsborough, Lincs.

Dublin Gliding Club celebrated Easter Sunday with a flight of nearly 50 miles to Mullingar in 3 hr. 50 min., coupled with a climb to 4,500 ft., by Michael Slazenger, whose father Ralph helped to found the Cambridge Club; and Ken Mellor, the chief instructor, flew a dog-leg Silver C course via Ardee to Slane, but his camera jammed at the turning-point, so he obtained no official evidence.

The identity of the two Southdown Club members who soared in French waves over La Llagonne (Gliding Notes, Apr. 8) has been disclosed at last: they are Peter Wilbur and Ron Walker.

• • •

Lasham had an Easter contest, too, with three contest days; it was won by Wally Kahn with a Skylark 3. Saturday's task was a race to Upavon and back, but Tony Deane-Drummond and Frank Irving turned at Netheravon instead, possibly because the Moonraker's gliders have just gone there from Upavon. Roger Mann won the race and earned 100 points; Wally Kahn got 95 and Hugh Mettam 90.

On Sunday a 98-mile race to Dunkeswell, short of Exeter, was won by Deane-Drummond; George Burton came second with 87 points and Kahn third with 80. Monday's task was a triangular race via Stockbridge and Hungerford, about 70 miles; Deane-Drummond was again the winner, and Kahn runner-up with 95 points.

Final scores were: Wally Kahn, 260; Deane-Drummond, 200; Hugh Mettam and Rika Harwood, 195; George Burton and Jill Walker, 142; Imperial College Eagle, 103; Roger Mann, 100; Frank Irving and Paul Minton, 93; Ann and Lorne Welch, 60.

• • •

AT Poona a flight of 5 hr. 13 min. with an altitude gain of 9,800 ft. has been achieved by Rashid Irani, age 15, son of Fardoon Irani who flew gliders at Dunstable in 1939 and is now Gliding Adviser to the Indian Government. Rashid made his first solo at the age of 9.

Correspondence

That Extravagant Tunnel

AGAIN the Channel Tunnel is news, and now this amenity is reinforced by a Channel Bridge. These projects are haphazardly costed from £100m. to £200m., a fabulous sum for any government or private enterprise to raise. Bearing in mind the emergency which we trust will never occur, this enterprise could have to be eliminated in a matter of a few seconds.

Why not improve the present combined method of marine ferries and, in particular, air ferries which have proved so efficient and reasonably priced in recent years?

The past 50 years have proved, beyond any doubt, that in the air, greatest progress in transport has been achieved. For this exercise in particular, and at a fraction of the cost mentioned earlier in my letter, an efficient fleet of air transports could be acquired.

Finally, and in my view by far my most important point, if unfortunately there is again an emergency, we have a ready made force to transport vehicles and equipment to the source of trouble. An asset quite unassessable because there is no time factor needed to build the fleet.

London, S.W.1. ERIC S. GREENWOOD.

Afterburning for Hovercraft?

THE Hovercraft which has now reached speeds in excess of 50 m.p.h. appears to be the ultimate marine vehicle which will at last marry the air and water elements for man's future transportation over the vast seas and oceans. It is still obviously in the experimental stages however. Two things appear to require improvement, one being the control of the amount of spray, and the second an increased operating clearance from the surface of the water. Should it be possible to increase the height above the water without the necessity of additional power, then the spray nuisance may be abated automatically.

Would a greater and more efficient air cushion be created by the addition of a crude oil jet spraying into the lower end of the "Funnel," below the engine, to heat up and expand the input of cold air in the same manner and principle as a gas turbine motor—or would the resultant improved performance be detrimental to the operating economics?

Gloucester. L. MORGAN.

Buried Where He Fell

WHILE on tour recently I passed this grave, a few feet from the highway of RN 44, between Laon and La Fère in Northern France. The inscription reads: "Frédéric Quellennec, Engineer, Brigadier of Artillery, Pilot Aviator, Escadrille No. 12, dying gloriously in aerial combat on March 31, 1916 at the age of 28, rests here where his aeroplane fell."

Roadside memorials are common. I have never before seen an actual tomb.

London, E.C.1. C. P. READ.

The Forgotten Passenger

THE letter in praise of flying-boats, "Flying Could be Comfortable" (Apr. 29, p. 541) is important because it stresses, perhaps accidentally, something which is not always obvious in such nostalgic outbursts. May I suggest that those who most deeply regret the passing of the flying-boat era are not really sighing for the return of the boat as such; they are regretting the days when passengers were still people.

The happiest memories are not those connected with flying-boats—which, for all their shipboard atmosphere, could often be exceedingly uncomfortable—but with the nature of the journeys. We remember the sight-seeing evenings, the nights spent in hotels and rest houses, the dawn take-offs and—most important of all—the sense of real movement from place to place and the natural climatic conditioning of a slower journey. We deliberately try to forget such things as the long midday hours of heat and wallowing bumps, and the queasiness during protracted engine-run-up manœuvres on the wintry waters of the Solent.

We forget, too, the thumping annual losses shown in B.O.A.C.'s accounts during the flying-boat era. With the need for the units in a modern airline fleet to average 10 hours or more of flying every day in the year, and with the flight crews' requirements for rest (legal and otherwise), today's trunk air services just could not be operated in the old way.

But there must be thousands of prospective passengers who will always prefer to travel in relatively slow and homely comfort and who are, even now, being wooed back from air transport by the shipping companies. Maybe someone might find it worthwhile to do a few sums to see whether the old-fashioned kind of air service, if operated on a worthwhile scale, would be economically practicable when using writtne-down piston-engined aircraft with interiors suitably refurbished for the purpose.

If the sums come out right even the IATA airlines might be glad to approve a new class of long-haul stopping service when this could also mean that older equipment would be kept in use—or sold more profitably to operators who were prepared to try to develop a largely forgotten but prospectively lucrative travel market.

London, S.W.3. A. H. HENDERSON.

Groundabout

Browned Off

"Well, I suppose we must now accept that Blue Streak and Black Knight are white elephants."

*

Moral Somewhere. Every time the British think up a new idea the Americans commercialize it, the Russians invent it and then the Japanese make it at half the price.

*

Wrong Again. The year's best bit of unintentional humour—in a book just out, on the familiar slip of paper stuck in the front, the list of the mistakes in the book is headed ERATTA.

*

Outside Looking In. From my correspondence I know to my pleasure that many people not "in" aviation are nevertheless fascinated by it. Now a company called Ideas Marketing Pool show how wide is this knowledgeable interest. Among aviation ideas they have received is a theory for a unique vertical take-off power unit, from a farm worker, an anti-wheel-skid device from a caretaker and a new tubeless tyre design from a dentist. Good luck to them, just as long as they keep off aviation humour.

*

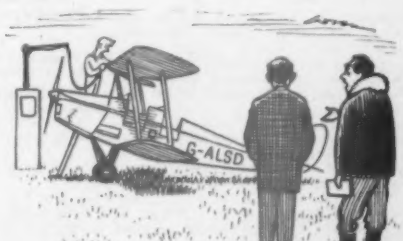
In the airline business, "PAX" means "Passengers." Absolutely no connection with the old Latin meaning.

*

From My Favourite Line Book

"No, I never got a Suez medal—I was on leave."

*



"—and just when I'd got Sandys to the point of saying 'All right, then, we'll encourage private flying', I woke up"

by Gren

Industry Record

Constant Speed Alternators

Following a licence agreement with Precision Mechanique Labinal in Paris, The Plessey Co., Ltd., are now starting to manufacture a range of aircraft constant-speed alternators. The 4-kVA. unit in this range is designed to operate at altitudes of up to 55,000 ft.; it has forced draught cooling and will withstand accelerations up to 15 *g* in all directions. Units of this type have been operating successfully in French fighters for some years and has French type approval.

At the present time units have been developed over the power range 4-19 kVA. and alternators of up to 35 kVA. are at present being investigated. These will embody the Labamatic principle of constant frequency control, which is based on electro-magnetic coupling incorporated in the drive to the alternator shaft. Constant rotor speed is maintained by controlling coupling slip by means of an amplifier system and a frequency sensitive network.

The electro-magnetic coupling may be employed in conjunction with a variety of gear drive arrangements. In order to improve efficiency an automatic two-speed gearbox is in some cases included in the drive. With this addition an engine speed range of 3½-1 may be obtained.

Electronic Airline Reservations

Trans-Canada Air Lines is expected to have its new £1,300,000 electronic reservations system in operation next year. Built by Ferranti-Packard Electric, Ltd., a Canadian subsidiary of Ferranti, Ltd., this equipment is designed to speed up reservations, increase effective output of the airline's agents and reduce the risk of human error to a minimum.

This system has a computer of the dual general-purpose serial-binary type capable of processing about 36,000 reservations an hour. Company engineers expect about 6,000 reservations per hour during peak periods in the initial stages.

The central registry computer consists of two computers sharing a single storage centre. Under normal conditions the two share the work load equally; each is capable of automatically taking over all functions should the other fail.

In the early stages, only a small portion of the computer's total potential will be utilized. It was designed to operate at high speeds because of the "random" nature of reservations functions and the company's determination to accommodate all peak loads without delays.

Tentative plans call for excess computer capacity to be eventually used for other functions such as recording statistics. The central registry, in Toronto, will be linked to some 350 reservations transactors in Canada and the U.S. by existing telephone lines.

The Hymatic Engineering Co., Ltd., has designed this inward relief and excess pressure valve for controlling the pressure of aircrew emergency oxygen supplies. It maintains the pressure at the mask sufficient to give unhindered breathing at heights up to 55,000 ft.

A Million Hour Control

Last week Ultra Electronics, Ltd., organized a private demonstration, for representatives of the aircraft industry, at Filton to mark the recent logging of over one million Proteus engine hours in revenue-carrying Bristol Britannias which are equipped with their electric engine controls. Held in the technical school of Bristol Siddeley Engines, the display included a number of recent additions to the Ultra aircraft equipment range as well as working examples of the company's Britannia engine control systems.

One item exhibited for the first time was a push-button control system designed for the operation of communication and navigation equipment, cabin address and inter-communication equipment. Working off the 28-V. aircraft supply, the system's basic station box, type UA 610, is suitable for the majority of modern civil and military transports and the push-button method of selection enables the front panel dimensions to be small. It provides immediate selection of the required service and makes it possible to listen out on a number of receiver channels simultaneously.

Fifteen push-buttons for the selection of various communication and navigation facilities are incorporated on the basic box, although a larger unit is available for providing up to 25 services. All buttons are of the pull "on"/push "off" type and each button is surrounded by an illuminated red ring when in the "on" position.

A typical system might control two VHF transmitter-receivers, two HF transmitter-receivers, ADF, ILS and VOR receivers, cabin address and intercom. To be fitted in a number of new types, the first installations of the equipment will be in the Westland Wasp helicopter and, later this year, the D.H. Beaver.

Another exhibit was the new Ultra engine condition analyser for displaying engine temperature and vibration information. This equipment, which was shown for the first time in a simplified form at the 1959 S.B.A.C. Exhibition, provides a continuous monitoring of the engine and is designed for use on pre-flight checks, flight monitoring and routine maintenance.

Comprising two units, a scanner for mounting in the equipment bay and a display unit for the flight deck, the analyser has 40 thermocouples for temperature measurement and eight vibration transducers. The information is displayed on two 3-in. x 1½-in. cathode-ray tubes.

This equipment has been ordered by Braniff Airlines for its Boeing 707-220s and Electras, and by B.O.A.C. for its DC-8s.

Aviation Calendar

May 6

London.—R.Ae.S. Rotorcraft Section lecture "The Personal Helicopter," by J. S. Shapiro, at the Library, 4 Hamilton Place, W.1, at 18.00 hrs.

May 11

Chester.—R.Ae.S. Chester Branch A.G.M. and Film Show, in the Lecture Theatre, Grosvenor Museum, at 19.30 hrs.

Hatfield.—R.Ae.S. Hatfield Branch 2nd Halford lecture. "Powerplants for Supersonic Transports," by J. S. Alford, in the Technical College, at 18.30 hrs.

London.—British Institution of Radio Engineers Radar Group lecture. "Radio Guidance in the Automatic Landing of Aircraft," by J. Shayler, at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.1, at 18.30 hrs.

Washington.—16th Annual National Forum of the American Helicopter Society at the Sheraton Park Hotel (May 11-14).

May 12

London.—R.Ae.S. Astronautics and Guided Flight Section lecture, "On Reducing Costs of Space Research," by J. E. Allen, at the Institution of Mechanical Engineers, Birdcage Walk, S.W.7, at 18.00 hrs.

May 17

London.—R.Ae.S. Historical Group lecture by Sir Thomas Sopwith, at the Institution of Mechanical Engineers, Birdcage Walk, S.W.1, at 18.00 hrs.

May 18

London.—R.Ae.S. 48th Wilbur Wright Memorial lecture "Mathematics and Aeronautics," by Prof. M. J. Lighthill, at the Institution of Mechanical Engineers, Birdcage Walk, S.W.1, at 18.00 hrs.

May 20

Wolverhampton.—R.Ae.S. Birmingham and Wolverhampton Branch A.G.M., at 19.30 hrs.

May 25

Hatfield.—R.Ae.S. Hatfield Branch A.G.M., in the de Havilland Restaurant, at 18.15 hrs.

London.—R.S.A. lecture. "The Prospects and Problems of Air Transport," by P. G. Masefield, at the Royal Society of Arts, John Adam Street, W.C.2, at 14.30 hrs.

Company Notices

NEW COMPANIES

Pumpkin, Ltd. (655,008).—Private Co. Reg. Apr. 1. Cap. £100 in 2s. 6d. shs. To compete in races, trials, tests, rallies and competitions of all kinds for automobiles, motor cycles, aircraft, yachts, etc. Directors: P. J. S. Lumsden, and Mrs. J. Lumsden, both of 18 Princes Gate Mews, S.W.7. Sec.: P. J. S. Lumsden. Sols.: Dawson and Co., 2 New Square, Lincoln's Inn, W.C.2. Reg. off.: 2 New Square, Lincoln's Inn, W.C.2.

Maranello Concessionaires, Ltd. (655,104).—Private Co. Reg. Apr. 1. Cap. £10,000 in 5s. shs. Manufacturers of and dealers in motor vehicles, ships, boats, aeroplanes, helicopters and rockets. Sec.: J. N. Nisner. Sols.: Wyatt Jeffrey and Co., London, W.2.

Britannia Developments, Ltd. (655,222).—Private Co. Reg. Apr. 4. Cap. £100 in £1 shs. Proprietors, manufacturers of and dealers in every kind of mechanically driven vehicle and means of transport or conveyance by land, water or air and all parts and accessories in connection with each of the foregoing. Sols.: Lovell, White and King, 1 Serjeant's Inn, Fleet Street, London, E.C.4.

CHANGE OF NAME

Strabor, Ltd. (569,491). Manufacturers of retractable aircraft steps, etc. 133 Rochester Road, Gravesend, Kent.—Name changed to Strabor (Aircraft), Ltd., on Nov. 6, 1959.

INCREASE OF CAPITAL

Avimo, Ltd. (328,043). Aeroplane component manufacturers, etc., 15 Hanover Square, W.1.—Increased by £84,000, in £1 ordinary shares, beyond the registered capital of £16,000.

Personal Notices

BIRTHS

Morris.—On Apr. 17 at R.A.F. White Waltham, to Jillian, wife of Flt. Lt. J. R. Morris—a son.

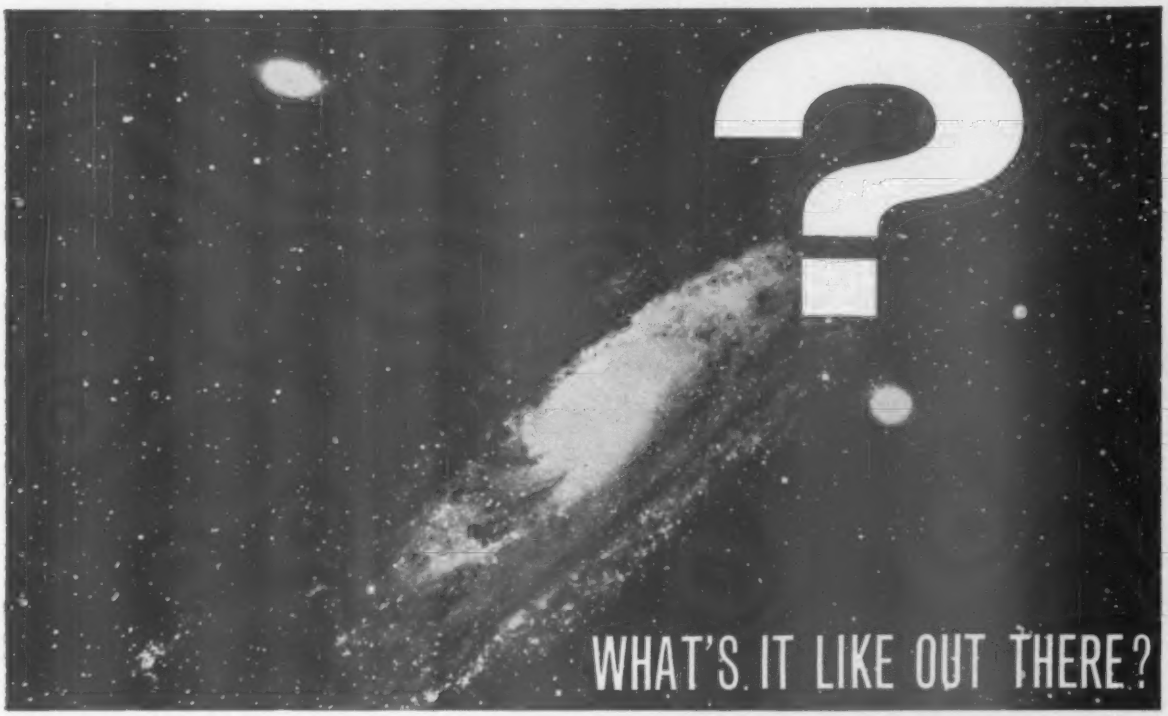
Stuart.—On Apr. 21, to Anne (*née* Cornock), wife of Sqn. Ldr. J. C. Stuart, D.F.C., R.A.F.—a son.

MARRIAGE

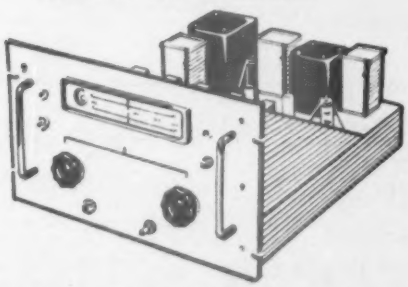
Ferenczy—Cole.—On Apr. 18, at St. Paul's Church, R.A.F. Akrotiri, Cyprus, Flg. Off. G. I. Ferenczy, to Beryl Elsie Cole.

DEATH

Potter.—On Apr. 18, Wg. Cdr. Stephen Holsworth Potter of The Mount, Ponterwyd, Cardiganshire.



KEEP IN TOUCH



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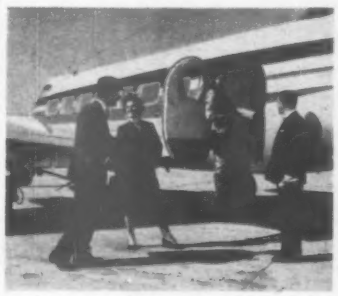

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APPLICATION No. 3011/2 for an amendment to the terms of approval of the U.K. Internal Service which they are authorized to operate on the route Cardiff and/or Bristol-Liverpool with Dove, Dakota, Bristol 170 and Convair 340 aircraft, at a frequency of three return flights weekly between April 1 and October 31 each year, so as now to enable them to operate at an increased frequency of seven return flights weekly.

These applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. 533-8

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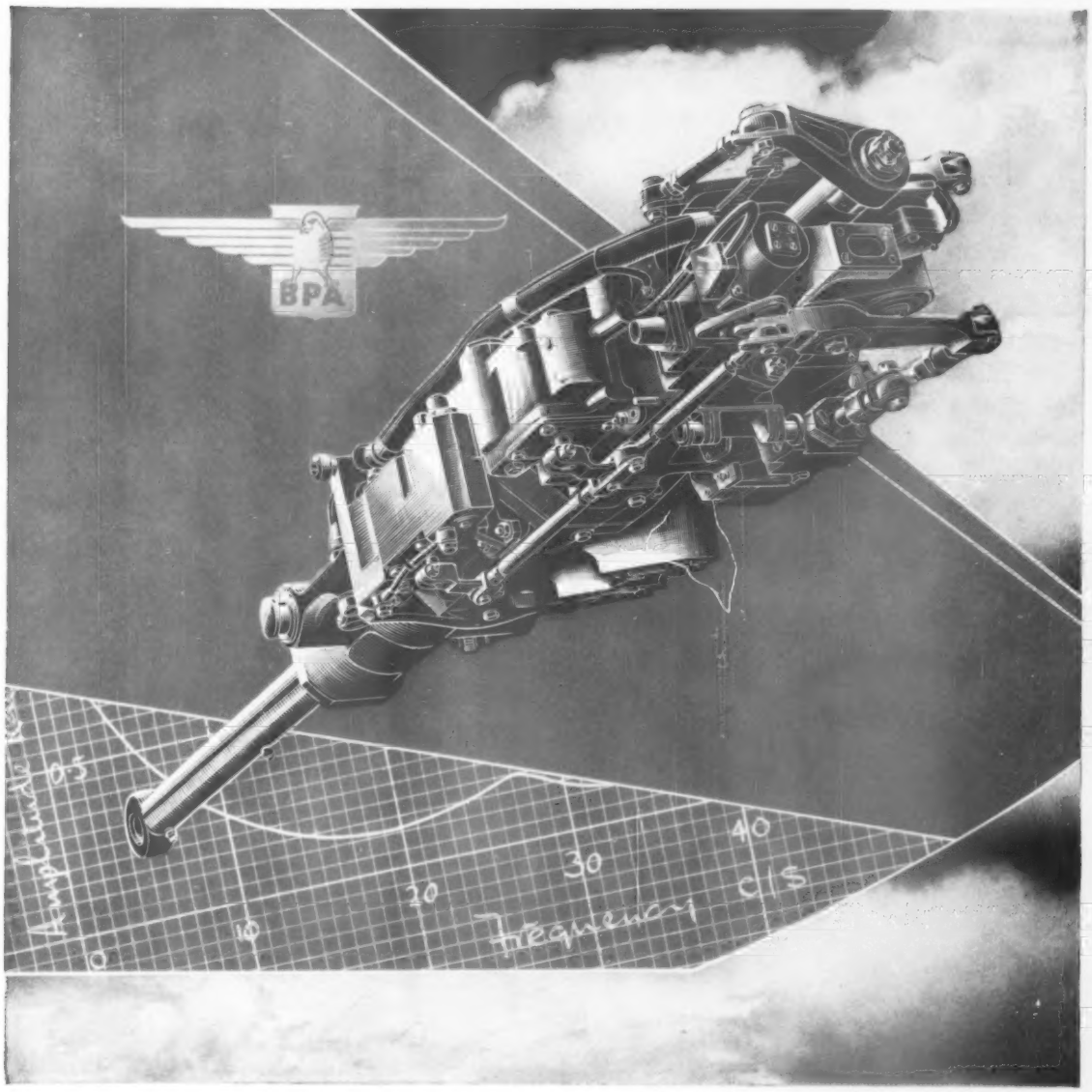

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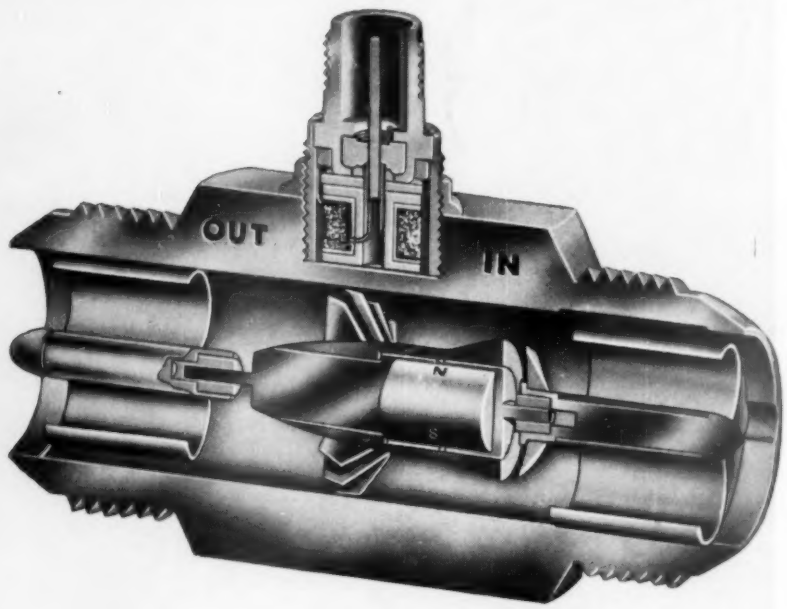

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